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MEMOIRS
OF THE
AMERICAN ENTOMOLOGICAL SOCIETY
NUMBER 4

THE BLATTIDAE OF PANAMA

BY
MORGAN HEBARD

PUBLISHED BY THE AMERICAN ENTOMOLOGICAL SOCIETY
AT THE ACADEMY OF NATURAL SCIENCES
PHILADELPHIA
1919

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MEMOIRS
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NUMBER 4

THE BLATTIDAE OF PANAMA[1]

BY MORGAN HEBARD

During a brief visit made by the author to the Canal Zone, in November, 1913, a few hours' collecting secured a small but interesting series of Orthoptera. The Canal Zone, though not possessing the altitudinal differentiation found in the Greater Antilles, was at once seen to be much more productive than Jamaica, visited during the same trip. This is partly due to the latter region being further from the equator, but in much greater degree to its insular character. In summing up, the Canal Zone might, indeed, be said to be a compact and restricted area, excellent for a critical faunistic study, the mingling in that region of forms from both North and South America being a feature of particular interest.

When the meagerness of the literature bearing on Panamanian Orthoptera was noted,[2] efforts were at once concentrated on secur-

[1] The Dermaptera of Panama have already been studied and reported upon by Hebard (Trans. Am. Ent. Soc., xliii, pp. 301–334, (1917)). Thirty species were recorded, all but one of which were represented in the collections studied.

[2] In 1896, Griffini published two papers on Orthoptera from Panama (Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 232, pp. 1 to 32, and xi, no. 236, pp. 1 to 12), in which fifty-nine species were recorded, fifteen being described as new. The following year Giglio-Tos published an additional paper for this region (Boll. Mus. Zool. Anat. comp. Univ. Torino, xii, no. 301, pp. 1 to 9), recording thirty-seven more species, of which six were new.

In the Biologia Centrali-Americana (1893 to 1909) all previous records of Orthoptera from Panama were included, as well as the material assembled as a basis for that study. In that paper a total of two hundred and twenty-five species were recorded, fifty of these being described as new.

In addition to these papers, the literature was found to contain only scattered records and descriptions of Panamanian species.

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ing sufficient material from the region to warrant publication of the data assembled. A visit to the United States National Museum developed that a very large and thorough collection had incidentally been made by men from that institution, and, through the kindness of Mr. A. N. Caudell, this material was put in our hands for study. For the small forms of the Blattidae, the excellent representation studied is largely from that series, collected principally by Mr. A. Busck. Considering the fact that he is a Microlepidopterist and not an Orthopterist, we take pleasure in congratulating him on the careful and thorough quality of his work. Further material was secured by the author from Mr. James Zetek, the total from that source being small, but containing some most interesting forms. Finally, in 1915, Mr. D. E. Harrower, who was going to the Canal Zone for Lepidoptera, volunteered to collect Orthoptera for the author as well. The series obtained by him was large and contained many additional forms.

As the total material collected is now much larger than has ever been assembled from one region in tropical America, it has been decided to undertake a complete summary, based on all available material from Panama, in America, with previous records and at present unrepresented species included in the tables on pages 6 to 9, to make the present work complete. The present paper, as a result, is a comprehensive summary of the Blattidae of the Canal Zone and vicinity.

The Canal Zone and vicinity, with localities indicated at which material studied in the present paper was taken, is shown in Plate I of the present paper.

We would remark that, in the Canal Zone and vicinity, lowland forests, marshes and limited open areas are the only types of country encountered, and that almost all of the material here studied, was taken in such environments. Very similar conditions are found in southern and eastern Costa Rica and in eastern Nicaragua to the north, and probably in northwestern Columbia to the south. Scarcely any work has, however, been done on the Orthoptera in those regions, but this, when accomplished, we feel certain will show a much wider distribution for many of the species here considered, which at present are known from comparatively limited areas on the Isthmus.

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The higher country in the vicinity of Chiriqui to the west has a rich fauna, as is shown by the small collections made there for the Biologia Centrali-Americana. This fauna probably contains a great number of forms not found in the lowlands of Panama, many of which are probably the same as those found in the highlands of Costa Rica. In eastern Panama we believe that a different highland fauna will be encountered, showing the northernmost distribution of many of the mountain forest types which occur in northwestern Colombia.

The material here studied was assembled by the following individuals for the collections noted: by A. Busck, E. A. Schwarz, A. H. Jennings and W. Schaus for the United States National Museum, and by D. E. Harrower and the author, for the author's collection. Material was also taken by J. Zetek for both collections. We would note that in all cases Orthoptera was collected as a side issue, except by the author, whose efforts in Panama were limited to a few hours of field work. The tremendous number of species of Blattidae which occur in any one region in tropical America is well indicated when we consider these facts. We can hardly consider that more than a beginning has been made in studying the Blattidae of Panama. We have, however, had an opportunity to locate certain difficult genera, associate the widely different appearing sexes of certain species and obtain a better general understanding of the American subfamilies of the Blattidae.

Taxonomy

We have been able to observe certain features which we believe will be of considerable value in studying this difficult family. Consideration of the specialization of the dorsal surface of the male abdomen, supra-anal plate, concealed genitalia and subgenital plate and styles, which is found in many species, has proved to be a vital necessity. In the female sex the type of subgenital plate has also been often found to be extremely important, but usually of generic rather than specific value. The number and type of pulvilli, armament of the ventral surface of the tarsi and development of the arolium has proved to be useful in many ways, while the asymmetry or specialization of the tarsal claws are features of importance. Many of these characters have been casually con-

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sidered or wholly overlooked in the past. We feel certain that the difficulty in studying so large and complex a family will be greatly lessened if they are properly considered in future work.

We would note the following features for the genera studied, or compared, in the preparation of the present paper.

Dorsal surface of male abdomen specialized in *Ceratinoptera*, *Dendroblatta*, *Eudromiella*, *Latiblattella*, *Antitheton*, *Rhytidometopum*, *Supella*; the Nahua Group of *Neoblattella*, *Blattella*, *Ischnoptera*, *Xestoblatta*, *Parcoblatta*, *Euphyllodromia*, *Pseudophyllodromia* (Pseudomopinae); *Chorisoneura* [weakly] and *Plectoptera* [weakly] (Oxyhaloinae).

Female subgenital plate valvular in *Anaplecta* (Ectobiinae); all known genera of the Blattinae; *Holocompsa*, *Hypercompsa*, *Latindia*, *Compsodes*, *Melestora* and *Buboblatta* (Corydiinae): with a medio-longitudinal cleft distad in *Lissoblatta* (Ectobiinae); *Euphyllodromia* [strongly] (Pseudomopinae), and *Chorisoneura* (Oxyhaloinae).

Tarsal claws asymmetrical in *Ectobius*, *Eutheganopteryx*, *Phyllodromica*, *Lissoblatta* (Ectobiinae); *Latiblattella*, *Antitheton* (Pseudomopinae); all genera except *Megaloblatta* of the Nyctiborinae, and *Chorisoneura* (Oxyhaloinae): specialized in *Chorisoblatta* (Ectobiinae); *Neoblattella*, *Cariblatta*, *Lophometopum* (Pseudomopinae), and *Plectoptera* (Oxyhaloinae).

We feel more than ever satisfied that it will be impossible to separate the subfamilies of the Blattidae by a few definite and readily discernible features. We have found a valvular female subgenital plate in several subfamilies besides the Blattinae, though this was supposed to be characteristic of that subfamily. The tarsal claws are asymmetrical in all the genera of the Nyctiborinae except *Megaloblatta*, but this feature appears in a number of genera clearly belonging to other subfamilies. The hooded pronotum, characteristic of almost all forms of the Perisphaerinae, is very weakly indicated, particularly in the male sex, in *Colapteroblatta*, a genus belonging to that subfamily, though we feel no doubt as to the proper assignment of this genus. The ulnar vein without branches, once supposed to separate definitely all of the Ectobiinae, was correctly determined by Shelford to have exceptions in that subfamily and to be a feature occasionally met with

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elsewhere, while the transverse supra-anal plate, for a time given as characteristic of that subfamily, is also worthless for any such purpose. Indeed, certain species of the Oxyhaloid genus *Chorisoneura* have a strongly transverse supra-anal plate, while others have the supra-anal plate triangularly produced. Thus we are forced to the conclusion that a general facies, produced by a combination of subtle characters, will be found the criterion for placing genera in their proper subfamilies. In most cases this is not a difficult matter to the experienced student. A Nyctiborine, Panchlorine, Blaberine or other subfamily facies is readily noted. In some groups, however, and usually among those showing adaptation to peculiar modes of living, particularly through atrophy of tegmina, wings and limb armament, such assignment may prove to be extremely difficult. We have not been able to assign such genera as *Hyporhicnoda*, *Pycnosceloides*, *Colapteroblatta* and *Litopeltis* without long continued study and comparison with all the genera which exhibited resemblance of any kind. In regard to *Anaplecta*, we feel no hesitancy in placing the genus in the Ectobiinae, particularly after finding that the genus *Lissoblatta*, though of close general similarity to *Anaplecta*, showed a number of characters agreeing instead with *Ectobius* and its nearer allies.

As to *Chorisoneura* and *Plectoptera*, the unarmed ventral femoral margins lead us to the conclusion that it is best to assign these genera to the Oxyhaloinae. Both are distinctive and widely separated from any other known genera, both in different ways show many indications of apparent approach to the *Anaplecta*, and particularly to the *Lissoblatta*, type. Whether this is convergence toward that section of the Ectobiinae, or indicates common ancestry, we are unable to state. We do feel, however, that until much more work is done in the Blattidae, these genera had best be left in the Oxyhaloinae.

The large unworked collections, frequently referred to while studying the present material, show that a mere beginning has been made on a modern classification of the Blattidae of tropical America. The multitude of as yet undescribed genera and species, when studied, will undoubtedly throw much light on many of the problems which at present can hardly be solved.

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We wish to thank most heartily Mr. A. N. Caudell of the United States National Museum for the opportunity to study the material belonging to that institution, and Mr. James A. G. Rehn, whose unceasing energy has now built up an extremely extensive determined collection at the Academy of Natural Sciences of Philadelphia, invaluable for reference in studies such as the present.

In the present paper eight hundred and ninety-four Panamanian specimens are treated, representing forty-seven genera and ninety-three species and races, of which ten genera and thirty-seven species are described as new.

From the literature we find that ten additional species have been recorded from Panama, bringing the total of genera and species known from that region to fifty-three genera and one hundred and three species. These species are tabulated below, their known distribution in North America, Panama, South America and the West Indies being indicated by asterisks, those having close affinity to other species occurring in the area checked being indicated by an "a".

We would remark that but two species, not including those generally distributed through all or the greater portion of tropical America, are also found in the West Indies, that forty-nine are known only from Panama, twenty-five from Panama and northward, nine from Panama southward and eighteen from Panama and North and South America. Two species are known from North and South America but have not yet been found in Panama.

Though we find the influence from North America stronger than from South America in the Canal Zone, we do not believe it to be as much greater as is indicated by the above figures, considering that a much greater amount of work has been done in Central America than in northern South America.

Species	North America	Panama	South America	West Indies
ECTOBIINAE				
Lissoblatta fulgida	*	*	—	—
Lissoblatta flabellata	*	*	—	—
Anaplecta lateralis	—	*	*	—
Anaplecta asema	*	*	—	—
Anaplecta sordida	—	*	—	—
Anaplecta gemma	—	*	—	—
Anaplecta hemiscotia	—	*	—	—
Anaplecta cabimae	—	*	—	—

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Species	North America	Panama	South America	West Indies
PSEUDOMOPINAE				
Euthlastoblatta compsa	—	*	—	—
Ceratinoptera picta	*	*	*	—
Dendroblatta sobrina	*	*	*	—
Aglaopteryx lita	a	*	—	a
Eudromiella bicolorata	—	*	—	—
Latiblattella inornata	a	*	—	—
Latiblattella angustifrons	a	*	—	—
Macrophyllodromia splendida	a	*	—	—
Chromatonotus heterus	—	*	a	a
Chromatonotus lamprus	—	*	a	a
Rhytidometopum megalopterum	—	*	—	—
Supella supellectilium	*	*	*	*
Cariblatta imitans	a	*	a	a
Neoblattella fratercula	*	*	—	—
Neoblattella acanthastylata	—	*	—	—
Neoblattella panamae	—	*	—	—
Neoblattella impar	—	*	—	—
Neoblattella chagrensis	—	*	—	—
Neoblattella nahua	*	*	—	—
Neoblattella fraterna	*	*	—	—
Lophometopum leptum	—	*	—	—
Blattella germanica	*	*	*	*
Ischnoptera nox	—	*	a	—
Ischnoptera rufa rufa	—	*	*	*
Ischnoptera rufa occidentalis	*	*	—	—
Ischnoptera gatunae	—	*	—	—
Ischnoptera bergrothi	*	*	—	—
Ischnoptera inca	*	*	—	—
Ischnoptera mirella	—	*	—	—
Ischnoptera panamae	—	*	—	—
Xestoblatta festae	—	*	—	—
Xestoblatta immaculata	—	*	—	—
Euphyllodromia angustata	*	*	—	—
Euphyllodromia decastigmata	—	*	—	—
Pseudomops aurantiaca[3]	—	*	—	—
Pseudomops gloriosa	a	*	—	—

[3] Kirby has placed this name in the synonymy under *Pseudomops deceptura* Walker, described from Pará, Brazil. Examination of the types, we believe, will show these species to be closely related but distinct.

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Species	North America	Panama	South America	West Indies
NYCTIBORINAE				
Nyctibora noctivaga	*	*	—	*
Eunyctibora nigrocincta	—	*	*	—
Paratropes biolleyi	*	*	*	—
Paratropes bilunata	*	*	—	—
Paratropes pinoganae	—	*	—	—
Megaloblatta blaberoides	*	*	a	—
EPILAMPRINAE				
Calolampra brevitarsis	—	*	—	—
Audreia bromeliadarum	—	*	—	—
Audreia gatunae	—	*	—	—
Epilampra azteca	*	*	—	—
Epilampra maya	*	*	—	—
Epilampra colombiana	*	*	*	—
Epilampra mexicana	*	*	—	—
Epilampra conspersa	*	*	*	—
Hyporhicnoda reflexa	*	*	—	—
BLATTINAE				
Lamproblatta albipalpus	—	*	*	—
Pelmatosilpha rotundata	—	*	—	—
Pelmatosilpha villana	—	*	—	—
Eurycotis biolleyi	*	*	—	—
Eurycotis pluto	—	*	—	—
Neostylopyga rhombifolia	*	—	*	—
Blatta orientalis	*	—	*	*
Periplaneta americana	*	*	*	*
Periplaneta brunnea	*	*	*	—
Periplaneta australasiae	*	*	*	*
PANCHLORINAE				
Leucophaea maderae	*	*	*	*
Pycnoscelus surinamensis	*	*	*	*
Pycnosceloides aporus	*	*	—	—
Panchlora cubensis	*	*	*	*
Panchlora exoleta	—	*	*	—
Panchlora colombiae	—	*	*	—
Panchlora minor	*	*	—	—
Panchlora translucida	*	*	—	—
Panchlora cribrosa	—	*	—	—
Achroblatta luteola	*	*	*	—
Phortioeca phoraspoides	*	*	—	—
Capucinella delicatula	—	*	*	—

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Species	North America	Panama	South America	West Indies
BLABERINAE				
Archimandrita tessellata	*	*	*	—
Blaberus colosseus	*	*	*	—
Blaberus discoidalis	—	*	*	*
Eublaberus biolleyi	*	*	—	—
Eublaberus posticus	—	*	*	—
Cacoblatta scabra	—	*	—	—
CORYDIINAE				
Holocompsa nitidula	*	*	*	*
Holocompsa panamae	—	*	—	—
Hypercompsa fieberi	—	*	*	—
Latindia dohrniana	*	*	—	—
Compsodes cucullatus	*	*	—	—
Melestora micra	—	*	—	—
Buboblatta armata	—	*	—	—
OXYHALOINAE				
Calhypnorna amoena	—	*	—	—
Calhypnorna pulchella	—	*	—	—
Chorisoneura parishi	—	*	*	—
Chorisoneura panamae	—	*	—	—
Chorisoneura fuscipennis	—	*	—	—
Chorisoneura translucida	*	*	*	—
Chorisoneura cabimae	—	*	—	—
Chorisoneura specilliger	—	*	—	—
Chorisoneura gemmicula	—	*	—	—
Plectoptera pulicaria	—	*	—	—
PERISPHAERINAE				
Litopeltis bispinosa	—	*	—	—

There are in addition a number of species recorded from both North and South America, but in all cases we feel that there is considerable uncertainty as to whether one and the same species is represented.

The following records from Panama we have reason to believe to be incorrect.

1896. *B[latta] vitrea* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 1. [♂, Darien.]

This record is probably applicable to a species of *Latiblattella*, probably *inornata* or *angustifrons*, described in the present paper.

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We believe that the southward distribution of *Latiblattella vitrea* (Brunner) will be found to fall far short of Panama.

1896. *B[latta] acolhua* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 1. [One specimen; Punta di Sabana, Darien.]

We believe that this specimen is referable to *Neoblattella fraterna* (Saussure and Zehntner). The opaque lateral portions of the pronotum noted, may be due to the specimen having been preserved in alcohol.

1889. *Nyctibora? holosericea?* Bruner, Proc. U. S. Nat. Mus., xii, p. 188. [Juv., Panama.]

1914. *Nyctibora brunnea* Caudell, Insec. Inscit. Menst., ii, p. 77. [Juv. ♀; Porto Bello, Panama.]

This material is almost certainly incorrectly identified. It may represent *Nyctibora noctivaga* Rehn or a smaller species of the genus, which we know to occur in Panama, but of which at the present time insufficient material is at hand for proper determination.

SYSTEMATIC TREATMENT

Subfamily ECTOBIINAE

LISSOBLATTA[4] new genus

The present genus is erected for two species which have been placed in *Anaplecta*. The oblique discoidal sectors of the tegmina and asymmetrical tarsal claws distinguish the species of the present genus, which differ further from those of *Anaplecta* in having a different type of subgenital plate in the female, and in having more ample pulvilli in both sexes. In the genotype the form is heavier and the tegmina and wings are broader than in the majority of the species of *Anaplecta*, though in the Elliptica Group a similar facies is found. The general appearance is decidedly Plectopterine.

GENOTYPE: *Lissoblatta fulgida* (*A* [*naplecta*] *fulgida*) (Saussure).

Generic Description. Size moderately large for the group; form stout, elliptical; smooth, shining. Head longer than broad (not

[4] From λισσός = smooth. The smooth roach.

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as much so as in the majority of species of *Anaplecta*) ocellar areas very feebly defined; ocellar spots very weak. Pronotum convex, without trace of discal sulci or depressions. Tegmina broad; costal margin convex to the rather sharply rounded apex: discoidal sectors oblique (see plate II, fig. 1). Wings broad; medio-discoidal area with numerous transverse veinlets, but no distal longitudinal veinlet. Male subgenital plate and appendages highly specialized (in some respects annectant between the general character of the types found in *Anaplecta* and in *Plectoptera*). Female subgenital plate convex distad with a deep medio-longitudinal linear cleft (not valvular as in *Anaplecta* or simple but strongly truncate distad as in *Plectoptera*).

Cephalic femora with ventro-cephalic margin armed with a long row of closely set, short, microscopic, piliform spines, terminating in two elongate distal spines, of which the more distal is slightly the longer; ventro-caudal margin supplied with a few stiff elongate hairs and (from none to two) elongate spines and distad with a single elongate spine. Median and caudal femora with ventral margins supplied with a few stiff elongate hairs and (one to four, the greater number always on the cephalic margin) elongate spines, all with a single elongate distal spine. Caudal tarsi with fourth joint alone supplied with and ventral surface fully occupied by a large pulvillus. Tarsal claws asymmetrical. Arolia large.

In addition to the genotype, we find *flabellata* (Saussure and Zehntner) to be a member of the present genus.

Lissoblatta fulgida (Saussure) (Plate II, figures 1 and 2.)

1862. *A[naplecta] fulgida* Saussure, Rev. et Mag. Zool., (2), xiv, p. 163. [Guatemala.]

1893. *Anaplecta jansoni* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 29., pl. iii, fig. 4, pl. iv, figs. 9 and 16. [Chontales, Nicaragua.]

Porto Bello, Panama, II, 15 and III, 15, 1911, (Busck), 1 ♂, 1 juv. ♂, (juv. ♂, dark).

Rio Trinidad, Pan., V, 7, 1911, (Busck; on *Citrus*), 1 ♀, (dark), 2 juv. ♀.

Bohio, Canal Zone, Pan., II, 7, 1911, (Schwarz), 1 ♀, (dark).

Paraiso, C. Z., Pan., I. 14 to IV, 14, 1911, (Schwarz), 2 ♂, 4 ♀, (1 ♂, 3 ♀, dark; 1 ♀, dark with banded tegmina).

Panama, Pan., VI, 1915, (Harrower), 1 ♂, (moderately dark).

Calidoma Road, Pan., IV, 12, 1911, (Jennings), 1 ♂, 1 ♀, 1 juv., (all pale).

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The series at hand shows conclusively that *jansoni* is merely a dark color phase of the present species, unworthy of nominal recognition.

Color.—In the present material four males, one female and one immature are shining hazel in general coloration. Of these, several are less reddish than the others, approaching ochraceous-tawny. All but one of the remaining specimens are darker, shining chestnut in general coloration, with one individual alone having the underparts as pale as in the light examples.

A single female is shining burnt sienna in general coloration, with tegmina distinctively marked proximad and mesad with moderately broad transverse bands of blackish brown, of which the median band is the wider.

The value of these color features would be more difficult to determine were it not known that similar and fully as remarkable color differences occur in the allied *L. flabellata*. Moreover, in the present series, other less noticeable but far more important features of coloration are common to all individuals. Those particularly noteworthy are: the maxillary palpi which are pale, with distal half of fourth and entire fifth joint very dark blackish; the pale antennae, spines of the limbs and tarsal joints. The color of the cerci, however, varies in accord with the individual general coloration.

Structure.—In the present insect the styles of the male subgenital plate are asymmetrical: the sinistral small and ovoid, situated on the dorsal surface of the plate at the margin and directed dorsad; immediately dextrad is situated a smaller dark chitinous projection directed caudad, with thorn-like distal portion curving ventrad; the margin between this process and the dextral style is weakly produced; dextral style nearly three times as long as sinistral, broader at base, tapering gently to the rounded apex, situated on the free margin and directed mesad along that margin.

Ootheca.—One female is at hand with ootheca partially extruded, carried horizontal. The ootheca has the suture supplied with rather widely spaced minute nodes, while a well-developed longitudinal carina is situated on each side about one-third the distance from the suture to the ventral margin.

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Lissoblatta flabellata (Saussure and Zehntner)

1893. *Anaplecta flabellata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 29, pl. iii, fig. 1, pl. iv, figs. 13 and 14. [♂, ♀: Teapa, Tabasco, Mexico; Chacoj, Vera Paz, Guatemala; Bugaba, Panama.]

Porto Bello, Panama, III, 10 and 13, 1911, (Schwarz, Busck), 2 ♀.
Paraiso, Canal Zone, Pan., I, 20 and II, 6, 1911, (Schwarz), 1 ♂, 1 ♀.

Color.—The present specimens have immaculate tegmina. A Guatemalan series of twenty-four specimens, at hand, shows all the transitions from this type to the one having the tegmina heavily marked with two distinct transverse dark nebulous bands. This variation was also noted by the original authors.

Ootheca.—A female, with ootheca slightly less extruded than in the specimen of *L. fulgida* discussed, is before us. In the present case the suture is dorsad. The structure of the ootheca is very similar in these two species. The position in which the ootheca is carried would, from this evidence, again appear to have little or no significance in systematic work in the Blattidae.[5]

ANAPLECTA Burmeister

1838. *Anaplecta* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 494.

GENOTYPE: *Anaplecta lateralis* Burmeister, selected by Kirby, 1904.[6]

The present genus, from the determined and undetermined material at hand, is seen to be one of the largest of the Blattidae. A great number of species apparently fall into the Lateralis Group, including very small forms, uniform and dark in coloration, with pronotum laterad and tegmina latero-proximad narrowly margined with whitish or buffy. That this group may require further division is shown by the fact that some of the species have comparatively simply developed appendages of the male subgenital plate, while in others these appendages are highly specialized. In addition, the wing development and venation shows some differentiation in certain forms. The difficulty of group assignment is increased by finding certain species of wholly different coloration, such as *A. asema* and *A. sordida* here described, which in structural features show nearest relationship to forms having the characteristic coloration of this group.

[5] See Hebard, Mem. Am. Ent. Soc., 2, p. 55 and p. 146, (1917).
[6] Syn. Cat. Orth., i, p. 66.

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The species having two striking longitudinal markings on the pronotum appear to be assignable to the Bivittata Group, these are more elongate and usually decidedly larger than the species of the Lateralis Group. Here again similar difficulty in delimiting the unit occurs, the pronotal markings being sometimes fused to different degrees, as in *A. hemiscotia* here described, or absent, as in *A. gemma* here described, structural features again obliging us to place these species with others which agree more closely in striking features of color pattern.

Still other species, such as *A. dohrniana* Saussure and Zehntner, and *A. cabimae* here described, clearly represent other distinctive and widely separated groups.

We feel satisfied that revision of the genus will show it to be comparatively homogeneous for so large a unit, but composed of a number of readily recognizable groups. This is one of the few genera of the Blattidae, which does not include domiciliary forms, found both in Africa and America.

The following features of limb armament we find characteristic of *Anaplecta*. Cephalic femora with ventro-cephalic margin armed with a long row of moderately closely placed, short, microscopic, piliform spines, terminating in two elongate distal spines, of which the more distal is slightly the longer; ventro-caudal margin supplied with a few stiff elongate hairs and (none to four) elongate spines, distad with or without a single elongate distal spine. Median and caudal femora with ventral margins supplied with a few stiff elongate hairs and elongate spines (one to four, the greater number always on the cephalic margin), all with a single elongate distal spine. Caudal tarsi without pulvilli, or with ventral surface of very small fourth joint alone fully occupied by a pulvillus. Arolia vestigial in species lacking pulvillus, moderately large in other species.

Key to the Panamanian Species of Anaplecta

This key is not of any diagnostic importance; it is given merely as a guide to the species here considered.

(Medio-discoidal area of wings with a distal longitudinal veinlet in all but *A. cabimae*.)

A. Disk of pronotum unicolorous, tegmina immaculate.

B. Disk of pronotum and tegmina blackish brown.

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C. Tegmina with costal margin narrowly but distinctly whitish. **lateralis** Burmeister

CC. Tegmina blackish brown with marginal field only slightly paler. **sordida** new species

BB. Disk of pronotum and tegmina pale, ochraceous.

C. Size larger, form moderately slender.....**asema** new species

CC. Size smaller, form less slender, *Plectoptera*-like....**cabimae** new species

AA. Disk of pronotum with two longitudinal dark bands or with tegmina strikingly maculate.

B. Disk of pronotum moderately pale, with two indistinct longitudinal dark suffusions. Tegmina ochraceous with a small, sharply defined, nearly rectangular marking of blackish brown proximad in the discoidal field....**gemma** new species

BB. Disk of pronotum pale, (normally) with two striking longitudinal dark bands. Tegmina with the dark brown of the anal and discoidal fields gradually fading into the ochraceous of the inner margin of the discoidal field and remaining portions.....**hemiscotia** new species

Anaplecta lateralis Burmeister (Plate II, figures 3 and 4.)

1838. *A[naplecta] lateralis* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 494. [Colombia.]

Porto Bello, Panama, IV, 17 and 21, 1911, (Busck), 6 ♂, 1 ♀.

Gatun, Canal Zone, Pan., VII, 17 to 23, 1916, (Harrower), 1 ♀.

Alhajuela, Pan., III, 6 to IV, 19, 1911 and 1912, (Busck), 1 ♂, 2 ♀.

Rio Trinidad, Pan., V, 2 to VI, 6, 1911 and 1912, (Busck), 16 ♂, 17 ♀.

Tabernilla, C. Z., Pan., V, 7 to VI, 14, 1907, (Busck), 11 ♂, 22 ♀.

Cabima, Pan., V, 20 and 22, 1911, (Busck), 2 ♀.

Corozal, C. Z., Pan., IV, 27, 1911, (Busck), 1 ♂.

Old Panama, Pan., XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 2 ♀.

Chorrera, Pan., V, 17, 1912, (Busck), 1 ♀.

To the present species Saussure's *A. fallax* shows nearest relationship, of which species a series is before us representing localities from Mexico to Costa Rica.

That the Lateralis Group is large and includes many species superficially very similar, is well demonstrated by numerous Central and South American examples before us. The male genitalia, though not widely differing in some of the species, we believe afford in themselves diagnostic differences for all the species of this group.

Little variation is noted in the large series of the present species at hand. The tegmina in all extend slightly beyond the apex of the abdomen, if the abdominal segments are in normal position.

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The length from occiput to apex of tegmina ranges in the series from 5 to 5.8 mm., the smallest examples being males. The body length averages 4.5 mm. in the males, 5 mm. in the females. This agrees with Brunner's diagnosis of what he believed to be the female type, but is larger than the dimension given that specimen by Burmeister. In general coloration the great majority are shining blackish brown, the remainder vary to as light as amber brown. These paler examples may very possibly have been captured before they had fully hardened and consequently before they had reached their normal adult depth of coloration.

In the present species the costal veins are distinctly clubbed distad; this is not true of the closely related *A. fallax*.

Ootheca.—One female is at hand with ootheca almost fully extruded, carried with suture dorsad. This ootheca closely resembles that discussed under *A. hemiscotia*, here described, differing only in having the suture even higher, its height equalling nearly half the distance from its base to the ventral margin, and with dorsal surface of suture more finely sculptured in similar fashion. It will be noted that this is a type of ootheca very widely distinct from that of *Lissoblatta fulgida* (Saussure).

Anaplecta asema[7] new species (Plate II, figure 5).

Apparently related to *A. azteca* Saussure,[8] differing in the cephalic coloration, tegminal apices, which are slightly more acute, and slightly shorter wings with different coloration of area of costal veins and of branches of axillary vein at base of appendicular field.

Type.— ♀ ; Gatun, Canal Zone, Panama. July 25 to 31, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 431.]

Size small, form moderately slender as in *azteca*. Head distinctly longer than broad; interocellar area forming, with margins of ocellar areas, a decided projecting but rounded ridge above each antennal socket; ocellar spots distinct. Pronotum rectangulato-oval, narrowing very slightly more cephalad than caudad; surface weakly convex, showing moderate latero-caudal flattening of the disk. Tegmina narrow, costal margin weakly convex to the sharply rounded apex; costal veins numerous (ten), simple; discoidal sectors few (four).[9] Wings proportionately

[7] From ἄσημα = without distinctive marking.

[8] A series of this species, including topotypic material, is before us.

[9] In all of the American species examined these sectors are longitudinal and composed of the median vein with one to three rami, and the ulnar vein, sometimes with one ramus, except in *A. domestica* Saussure and Zehntner and *A. cabimae*, here described, in which the median and ulnar veins have no rami.

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broader than in *azteca;* costal veins (eight) weakly arcuate and strongly clubbed distad; medio-discoidal area large with two transverse veinlets, the more distal oblique and sending from slightly below the mesal point a longitudinal branch distad; appendicular field in length about two-fifths that of remaining portion of wing, length equal to width. (The features given below are characteristic of the species of the genus.) Supra-anal plate transverse; free margin evenly convex, with numerous hairs. Subgenital plate roundly produced with medio-distal area defined proximad by a transverse sulcus and cleft medio-longitudinally.[10] Limbs slender. Ventro-cephalic margin of cephalic femora with (two) very slender and elongate proximal spines, succeeded by a row of microscopic, very short, rather closely set spinulae, terminated distad by two very slender spines, very elongate in increasing ratio distad. Ventro-caudal margins of all femora with a few hairs. Ventro-cephalic margins of median and caudal femora with a few elongate, slender spines. Tarsi very elongate;[11] claws of last joint very delicate, elongate; arolium minute.

General coloration ochraceous-buff, disk of pronotum slightly darkened. Head with occiput ochraceous-buff[12] to a moderately broad, transverse band of prout's brown between the ocellar areas; below ochraceous-buff, faintly clouded in places with prout's brown; eyes blackish brown; ocelli light buff. Wings hyaline, weakly iridescent, washed weakly with prout's brown, except in area of costal veins toward their bases and in appendicular field where they are heavily washed with this color; area of costal veins where they are clubbed, and narrow area at the extremities of the rami of the axillary vein bordering the appendicular field, ochraceous-buff.[13]

Allotype.— ♂; Tabernilla, Canal Zone, Panama. May 13, 1907. (A. Busck.) [United States National Museum.]

Agrees fully with type except in the following features. Abdomen more slender, as would be expected in the male sex. Supra-anal plate remarkably specialized: about twice as wide as long, free margin bracket-shaped, with slightly produced mesal apex deflexed; dorsal surface of plate deeply impressed, forming a large meso-proximal depression, about which the caudal margin of the preceding segment is roundly emarginate; three-fifths the distance to the free margin of the supra-anal plate is a low transverse ridge, heavily clothed on its cephalic face with long stiff hairs directed cephalad, which tuft of hairs nearly fills the depressed area of this plate. Subgenital plate simple, slightly the more produced dextrad; free margin curving evenly at dextro-caudal angle, the small simple style there situated elongate conical, about twice as long as basal width; margin interrupted at sinistro-caudal

[10] This is one of the types of female subgenital plate in the Blattidae which we term valvular. See plate II, fig. 4.

[11] The pulvilli are either entirely absent or so minute as to be indistinguishable under the highest magnification of a Zeiss binocular.

[12] In two males before us the ridge between the eyes is cream color, broadening mesad into a large triangular patch, with apex ventrad.

[13] In one paratype before us these markings are even more decided. This feature has been accessible for study only in the few individuals of which the wings have been spread.

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angle by a minute transverse ledge with its free margin straight, on which at its inner extremity is situated the sinistral style, this style springing from a socket and similar to but slightly larger than the dextral style.

We would note that the remarkable supra-anal plate here described is a type common to a number of the related species of *Anaplecta*.

Measurements (in millimeters)[14]

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tabernilla, *allotype*	6.3	1.4	2	5.6	1.8
Tabernilla, *paratype*	5.4	1.4	1.9	5.3	1.7
Tabernilla, *paratype*	5.5	1.5	2	5.6	1.8
♀					
Corozal, *type*.....	5.2	1.6	2.1	5.6	1.7
Corozal, *paratype*.....	6.2	1.6	2	5.8	1.8
Tabernilla, *paratype*	5.5	1.6	2	5.2	1.8

In addition to the type and allotype, we have before us the following material, of which the Panamanian examples are designated paratypes.

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, III, 27 to V, 15, 1906, (Barber, Schwarz), 2 ♂, 3 ♀, [United States National Museum].

Trinidad River, Panama, VI, 3, 1912, (Busck), 1 ♀.

Tabernilla, Canal Zone, Pan., V, 13 to VI, 8, 1907, (Busck), 2 ♂, 2 ♀.

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; under dead leaves in jungle), 1 ♀.

Anaplecta sordida new species (Plate II, figure 6.)

The present insect agrees closely with *A. asema* in wing venation, but differs in the very dark general coloration, head with less prominent borders of the ocellar areas, less acuminate tegmina and proportionately less ample appendicular field of the wings. The male sex of this species being unknown, we are less able to state definitely its position in the genus.

Of the other very dark species without pale tegminal margins, we find from the description that, besides differing in other features, *A. otomia* Saussure, is distinctive in the decidedly reflexed lateral margins of the pronotum and tegmina, while *A. dohrniana* Saussure and Zehntner belongs to a different group, in which the wings have the medio-discoidal area showing no longitudinal distal vein.

[14] We find that for several of Saussure's species of the genus, determined with full satisfaction in other respects, our material is distinctly smaller than the measurements given by that author. This is true of our series of the Mexican *asteca*, the typical series of which we do not believe will be found to show as much size difference from the present insect as Saussure's original description (Miss. Sci. Mex., Rech. Zool., vi, p. 17, (1870)) would indicate.

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Type.— ♀; Porto Bello, Panama. August 18 to 21, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 428.]

Size small, form somewhat broader than in *asema*. Head appreciably longer than broad, these proportions not as contrasting as in *asema*, interocellar area forming, with margins of ocellar areas, a distinct ridge above each antennal socket, this ridge not projecting as much as in *asema;* ocellar spots distinct. Pronotum trapezoid-oval, narrowing distinctly more cephalad than caudad; surface weakly convex, showing shallow but distinct latero-caudal transverse sulci of disk. Tegmina narrow, costal margin weakly convex to the narrowly rounded apex; costal veins numerous (twelve) and faintly enlarged distad; discoidal sectors few (four). Wings proportionately not as broad as in *asema*, much as in *A. azteca*, venation much as in those species; costal veins (nine) heavily clubbed distad; medio-discoidal area as described for *asema;* appendicular field in length about half that of remaining portion of wing, length slightly greater than width. Supra-anal and subgenital plates and armament of limbs as typical for genus, described under *asema*.

General coloration shining blackish brown. Head uniform, 'deep ochraceous-tawny; eyes blackish brown. Antennae ochraceous-buff proximad, deepening immediately to blackish brown. Lateral margins of pronotum and marginal field of tegmina transparent, tinged with prout's brown; remaining portions of tegmina translucent, deep, rich prout's brown. Abdomen blackish brown; limbs of same coloration shading to buckthorn brown distad. Cerci buckthorn brown.

Length of body, 5.4; length of pronotum, 1.4; width of pronotum, 2; length of tegmen, 5.1; width of tegmen, 1.8 mm.

In addition to the type, a single paratypic example is at hand.

Cabima, Panama, V, 22, 1911, (Busck), 1 ♀.

This specimen differs in having the head shining blackish brown except for a transverse rectangular area between the ocellar spots which is ochraceous-tawny, while the antennae, cerci and distal portions of the limbs are paler, ochraceous-buff.

Length of body, 5.7; length of pronotum, 1.4; width of pronotum, 1.9; length of tegmen, 5.2; width of tegmen, 2 mm.

Anaplecta gemma new species (Plate II, figure 7.)

This beautiful insect is a member of the Bivittata Group[15] of the species of which it has the characteristic dark markings least extensive. It differs from *A. bivittata* Brunner,[16] in the very weakly suggested dark markings of the pronotum, the distinctly less extensive dark marking of the tegmina and in the greater size.

[15] We have commented upon this group under *A. hemiscotia* on page 20.

[16] A single male of that species, recently recorded by Rehn, from Igarapé-Assú, Brazil, is in the Academy collection.

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The male sex of the present species is unknown, and we are consequently unable to compare the genitalia, which we believe, from examination of males of other species of the group in the unstudied material before us, will be found to be very distinctive.

Type.— ♀; Porto Bello, Panama. August 18 to 20, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 429.]

Size small, form slender; much as in *A. hemiscotia*. Head distinctly longer than broad; ridges above antennal sockets nearly as decided as in *A. asema*; ocellar spots distinct. Pronotum much as in *hemiscotia*. Tegmina narrow; costal margin weakly convex to the narrowly rounded apex; costal veins numerous (twelve), simple; discoidal sectors few (five). Wings elongate, not proportionately as broad as in *asema*, in this respect as in *A. sordida*; costal veins (nine) rather heavily clubbed distad; medio-discoidal area large with four transverse veinlets, the distal veinlet angulate one-third its length from median vein, sending from this angle a longitudinal branch distad; appendicular field in length slightly more than two-fifths the length of the remaining portion of the wing, length equal to width. Supra-anal and subgenital plates and armament of limbs as typical for genus, described under *asema*.

General coloration rather pale. Head uniform dresden brown, ocellar spots buffy. Pronotum with lateral margins hyaline tinged with buffy, mesal portion ochraceous-buff, laterad with prout's brown suffusions cephalad, mesad and caudad.[17] Tegmina transparent, heavily tinged with yellow ocher, this strongest distad, with a sharply defined, small, roughly oval, blackish chestnut brown patch meso-proximad in the discoidal field, which sends a weak ray of the same color proximad along the humeral trunk. Abdomen prout's brown; limbs warm buff; cerci buffy suffused with prout's brown.

Length of body, 6.7; length of pronotum, 1.7; width of pronotum, 2.3; length of tegmen, 6.8; width of tegmen, 1.8 mm.

The type is unique.

Anaplecta hemiscotia[18] new species (Plate II, figure 8.)

The present species is a member of the Bivittata Group, the majority of the species of which have two striking dark longitudinal markings on the pronotum;[19] this is also true of *mexicana* and its nearer allies, which species are, however, larger, pale in general coloration and more elongate.

[17] These suffusions clearly analogous in the present species to the striking longitudinal bands found in *bivittata*, *analisignata* and *hemiscotia*.

[18] From ἡμι-σκότια = half dusky.

[19] There are species, however, which should be referred to this group, which have the dark pronotal markings less sharply linear. This is shown to a decided degree in *A. gemma*, here described.

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When compared with the species of apparently nearest relationship, *A. bivittata* Brunner,[20] the present insect is found to have the head differently marked, the vertex not being solidly dark, the tegmina differently bicolored and lacking a distinctive meso-proximal dark blotch and the male genitalia showing very distinctive features.

Compared with *A. analisignata* Rehn, the present insect is seen to be larger with very different head and tegminal color pattern.[21]

The tegminal coloration in the present species is very distinctive, though undoubtedly derived from the same type as that found in *gemma*, *bivittata* and *analisignata*.

Type.— ♂; Corozal, Canal Zone, Panama. November 17, 1913. (M. Hebard.) [Hebard Collection, Type no. 430.]

Size small, form slender, slightly more so than in *A. azteca* or *A. asema*. Head distinctly longer than broad; ridges above antennal sockets distinct, not as decided as in *asema*, not as weak as in *A. sordida*; ocellar spots distinct. Pronotum rectangulate-oval narrowing very slightly more cephalad than caudad; surface weakly convex, showing small but distinct latero-caudal transverse sulci of the disk.[22] Tegmina narrow; costal margin weakly convex to the narrowly rounded apex; costal veins numerous (twelve), simple; discoidal sectors few (five).[23] Wings moderately broad; costal veins (seven; seven to nine in the series) strongly clubbed distad; medio-discoidal area large with two (to three in the series) transverse veinlets, the more distal oblique and sending from near its base at the median vein a weakly oblique longitudinal branch distad; appendicular field in length about two-fifths that of remaining portion of wing, length equal to width.

Supra-anal plate moderately transverse; lateral margins convergent, rounding broadly into distal feebly convex portion without angulation, supplied with numerous hairs; dorsal surface highly specialized as in *asema*. Subgenital plate produced scoop-shaped, lateral portions perpendicular: sinistral margin straight produced and weakly declivent to a very wide, more strongly declivent and oblique socket,

[20] A single male of this species, recently recorded by Rehn from Igarapé-Assú, Brazil, in the Academy Collection, is employed for this comparison.

[21] The abdomen is missing in the type and genital comparisons in consequence can not be made. In the remaining described species of the group, *A. pallida* Bolivar, the tegmina are uniform testaceous.

[22] In forms of the present genus in which these sulci are more distinct, smaller latero-cephalic transverse sulci are sometimes feebly indicated.

[23] In some specimens of the series an additional longitudinal vein is weakly defined, distad only, between the discoidal and median veins. This is true for many species of the genus. The number of discoidal sectors varies individually, occasional specimens showing an ulnar ramus or a supplementary ramus of the median vein. The unimportant character of these is shown by the fact that such rami are frequently found in one tegmen and not in the other of the same specimen.

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from which springs the sinistral style; distal margin from this point briefly convex nearly to the small dextral style socket, the greatest convexity slightly dextrad of the mesal point; dextral margin over half again as long as sinistral margin, likewise straight produced and weakly declivent from its base. Sinistral style directed mesad and nearly reaching dextral style; elongate, tapering from stout base to slender cylindrical portion before apex, apex flattened and roundly angulato-produced caudad, with a projecting, straight, aciculate production at its ventro-distal margin.[24] Dextral style minute, cylindrical with rounded apex, vertical, three times as long as wide, about one-third as long as sinistral style. Limbs and armament of same typical for genus, as described under *asema*.

Allotype.— ♀; Gold Hill, Canal Zone, Panama. November 14, 1913. (Hebard; in heavy vine overgrowth of low bushes.) [Hebard Collection.]

Agrees with type in all ambisexual characters. Supra-anal and subgenital plates typical for genus, as described under *asema*.[25]

Coloration antimony yellow and blackish chestnut. Head with occiput antimony yellow shading to ochraceous-tawny on face, but with narrow vertical suffusions of blackish brown from occiput along inner margins of eyes to ocellar areas.[26] Pronotum with lateral margins transparent buffy, two rather heavy parallel stripes of blackish brown run from the cephalic to the caudal margin, these widening slightly mesad and caudad, median area antimony yellow. Tegmina with marginal and scapular fields and apex and adjacent margin of discoidal field to median vein, transparent, tinged with antimony yellow to old gold; remaining portion of tegmina translucent, blackish chestnut brown, often with a minute point of the paler color proximad in the anal field toward the costal margin. Wings hyaline, weakly iridescent, washed weakly with prout's brown, appendicular field more heavily washed with this color, area of costal veins and area at extremities of rami of axillary vein bordering the appendicular field, heavily suffused with the same color.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	6.1	1.6	2	5.7	1.8
♀					
Allotype	5.6	1.7	2.2	5.9	2

[24] In consequence this resembles in outline the head of the Buffle Head Duck. The paratypic males before us show the shape of the apex of this specialized sinistral style to be variable, ranging from the form found in the type, through broadly enlarged with a disto-ventral angulation, to weakly and roundly enlarged.

[25] The females can be separated from those of other species of the genus by the form of tegmina and wings, and their venation, and by the color pattern. Throughout the genus it is these features which must be relied upon chiefly to separate the females of the different species.

[26] These evidently a continuation of the paired dark pronotal stripes.

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The large series before us shows no appreciable size variation, nor is any marked variation in tegminal or wing length indicated, as was also found true for *A. lateralis*.[27]

The extremes of maximum recession and intensification of coloration are not widely different, but the following features should be noted. In recessive examples the paired pronotal dark longitudinal lines are narrower and, in extreme individuals, broken; the tegmina show the dark suffusion much reduced, this remaining strongly defined only in the anal fields and beyond the anal vein. In intensive examples the paired pronotal dark bars broaden and, in extreme examples, almost fuse at the caudal margin and again near the cephalic margin, leaving the small meso-caudal intervening area alone conspicuously pale; the tegmina when at rest appear solidly dark in such examples, except narrowly along the costal margins.

In addition to the type and allotype, we have before us the following material, which may be considered paratypic.

Porto Bello, Panama, IV, 17, 1912, (Busck), 1 ♀.
Taboga Island, Pan., VI, 11, 1911, (Busck), 1 ♂.
Tabernilla, Canal Zone, Pan., VI, 1 to VII, 31, 1907 and 1911, (Busck), 19 ♂, 13 ♀.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♀.
Canal Zone boundary five miles west of Empire, Pan., XI, 14, 1913, (Hebard), 1 ♂.
Paraiso, C. Z., Pan., IV, 24 to V, 10, 1911, (Schwarz, Busck), 1 ♂, 2 ♀.
Cabima, Pan., V, 20 and 22, 1911, (Busck), 2 ♀.
Corozal, C. Z., Pan., XI, 14, 1913, (Hebard), 2 ♀; IV, 6, 1911, (Busck), 1 ♂.
Chorrera, Pan., V, 10 to 17, 1912, (Busck), 3 ♂.

Ootheca.—One female is carrying an almost completely extruded ootheca, with suture dorsad. This ootheca is very remarkable in having a very heavy sutural ridge, in height one-quarter the width of the remaining portion of the ootheca and nearly as wide as high, this ridge showing on its dorsal surface a succession of raised longitudinal fleur-de-lis with their lateral portions elongate and slender. The lateral surface of the ootheca is very strongly convex, partitioned into five convex sections by deep vertical sulci and ribbed longitudinally, showing on each side fourteen carinae. The ootheca is about two millimeters in length.

[27] That such variation is very decided in some species is shown by Shelford for his *A. varipennis*, while in the small series of *A. fallax* before us, great tegminal and wing variation is found.

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Anaplecta cabimae new species (Plate II, figure 9.)

This species is widely separated from any other here considered. It shows apparent relationship to the Peruvian *A. alaris* Saussure and Zehntner, differing from that species in the smaller size, unicolorous tegmina and decidedly suffused wings, with different venation of the medio-discoidal area. The sex of *alaris* can not be ascertained from the original description; the male genitalia of that species will probably be found to show distinct differences from those of the present species.

In general coloration and form of tegmina similarity to *A. domestica* Saussure and Zehntner[28] is shown by the present species, which however differs in the smaller size and very distinct tegminal venation.

In general appearance this minute, straw-colored roach looks much like certain species of Coleoptera.

Type.—♂; Cabima, Panama. May 20, 1911. (A. Busck.) [United States National Museum.]

Size very small, form slender for the genus. Head scarcely longer than broad; vertex evenly convex without distinct ridges over the antennal sockets; ocellar spots present, very inconspicuous. Pronotum approaching oval, the caudal margin showing more truncation, this margin very feebly obtuse-angulate convex; surface weakly convex, with no trace of discal sulci. Tegmina extending a brief distance beyond apex of abdomen, narrow; costal margin very feebly convex to near the apex, where it bends more sharply to meet the sutural margin, which is almost straight, apex sharply rounded; costal veins inconspicuous, not numerous (seven), with a few spurious intermediate veins distad; discoidal sectors two in number (the median and ulnar veins, unbranched). Wings not broad; costal veins simple, subobsolete in clouded area (four to five), combining with the similar distal veinlets (four to five), which also spring from the discoidal vein as it curves to meet the median vein at the distal extremity of the medio-discoidal area; medio-discoidal area, before this point, without transverse veinlets; appendicular field in length about three-quarters that of remaining portion of wing, length equal to width.[29]

[28] Two Guatemalan females of *domestica* are before us. Unlike the type, these specimens have the wings suffused, as in *cabimae*, but the radiate field is iridescent, not dull as in that species.

[29] In this example, instead of the anal vein running to the apex of the wing along the medio-longitudinal fold, an entirely different venation is found. From examination of other individuals of the species, we feel satisfied that this is a remarkable individual variation and not of any specific value, as conditions from the type described below to the normal are found in the series of this species at hand.

Cephalic portion of appendicular field with a vein (ulnar, recrudescent?) which runs a brief distance obliquely from the proximo-internal angle toward the mesal portion of the free margin; caudal portion with a vein (anal, recrudescent?) which runs obliquely from the proximo-internal angle toward the mesal portion of the free margin and disappears before reaching that margin, as described for *alaris*.

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Supra-anal plate transverse, free margin evenly convex, dorsal surface unspecialized. Subgenital plate extending the same distance caudad as the supra-anal plate, surface evenly convex, free margin with convexity greatest dextrad, where the production is a little the greatest; dextral style situated at that point, a minute knob no longer than broad; minute sinistral style situated in the same relative position sinistrad, two-thirds as large as dextral style but otherwise similar. Limbs and armament of same type as described from *A. asema*, but in the present species showing the following decided reduction. Ventro-cephalic margins of cephalic femora lacking the proximal heavy spines; cephalic margins of median and caudal femora with a single spine or sometimes with one or more of these margins entirely unarmed.[30] Ventro-caudal margins of limbs unarmed.

Allotype.— ♀; same data as type. [United States National Museum.]

Agrees with type in ambisexual characters, differing in the following respects. Form very slightly but appreciably more robust. Tegmina reaching very slightly beyond apex of abdomen. Supra-anal and subgenital plates typical for genus, as described under *asema*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	3.8	1.2	1.65	4.1	1.4
♀					
Allotype	4.6	1.2	1.7	3.8	1.4

Very little size variation is shown by the present series. The sexes have the tegminal length ranging from 3.8 to 4.3 mm. The males have the body length from 3.8 to 4, the females from 4.4 to 4.8 mm.

Coloration.—Dorsal surface and antennae immaculate, shining, ochraceous-tawny. Head deep ochraceous-tawny, eyes blackish chestnut brown. Tegmina entirely unicolorous, moderately transparent, ochraceous-tawny. Wings suffused with prout's brown, this heavy in the brief area of the costal veins and cephalic portion of the appendicular field, weakest in the medio-discoidal area and in the radiate field, which shows no trace of iridescence. Underparts and limbs pale, the ventral surface of the abdomen palest, ochraceous-buff tinged with tawny.

Intensification and recession in the present series is slight; the darker individuals have the antennae much darker, prout's brown, while the underparts are uniformly ochraceous-tawny.

In addition to the type and allotype, the following specimens are considered paratypes.

Rio Trinidad, Panama, V, 5, to VI, 10, 1911 and 1912, (Busck), 1 ♂, 4 ♀.

Tabernilla, Canal Zone, Pan., V, 17 and VI, 8, 1907, (Busck), 1 ♂, 1 ♀.

Cabima, Pan., V, 18 to 21, 1911, (Busck), 2 ♂, 1 ♀.

[30] As has been noted elsewhere, reduction in the armament of the limbs in a species of the Blattidae appears to be accompanied by irregularity in the spines which remain. This is true for the present species and is generally met with in the species of the genus *Blaberus*.

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Subfamily PSEUDOMOPINAE

A Key to the Described American Genera Belonging to the Group Blattellites

A. Ventro-cephalic margin of cephalic femora with a row of spines which decrease suddenly in size mesad, those distal being piliform; or armed with a row of spines which are entirely piliform.[31]

B. Tarsal claws unspecialized. Interocular space showing no ridge.

C. Pulvilli and arolia absent. (Limbs stout. Ventro-cephalic margin of cephalic femora with a row of piliform spines, with two heavy distal spines. Tegmina with discoidal sectors oblique.[32] Dorsal surface of male abdomen specialized. Wings with costal veins very weakly clubbed, ulnar vein with branches extremely distal or lacking, intercalated triangle very small.)

2. **Ceratinoptera** Brunner

CC. Pulvilli and arolia present.

D. Pulvilli on fourth tarsal joint only. Ventro-cephalic margin of cephalic femora with two heavy distal spines. (Tegmina with discoidal sectors oblique.[33] Wings with costal veins clubbed, intercalated triangle very small.)

E. Dorsal surface of male abdomen unspecialized. Ventro-cephalic margin of cephalic femora with a row of heavy proximal spines, succeeded by a row of minute piliform spines.

F. Limbs slender. Tegmina and wings fully developed.

1. **Euthlastoblatta** Hebard

FF. Limbs stout. Tegmina and wings reduced. (Male concealed genitalia not highly specialized).....4. **Aglaopteryx** Hebard

EE. Dorsal surface of male abdomen specialized. Ventro-cephalic margin of cephalic femora armed with a row of minute piliform spines.[34] (Limbs slender. Interocular space very narrow. Head strongly deplanate. Tegmina and wings fully developed in male, moderately reduced in female.).....3. **Dendroblatta** Rehn

DD. Pulvilli on all four proximal tarsal joints. Ventro-cephalic margin of cephalic femora with three heavy distal spines. (Ventro-cephalic margin of cephalic femora with a row of heavy proximal spines, succeeded by a row of minute piliform spines.)

E. Tarsal claws symmetrical.

F. Tegmina with discoidal sectors decidedly oblique. Dorsal surface of male abdomen specialized. (Wings with costal veins very briefly and

[31] In this type there is evidence to show that some, if not all, of the species have had the heavy proximal spines lost through atrophy.

[32] Individual reduction in the tegmina of the species of this genus frequently results in the obliteration of the discoidal sectos.

[33] In the genus *Aglaopteryx* material is found with tegmina so reduced that the discoidal sectors are frequently obliterated.

[34] Variable in this feature. Individually armed with very few or no heavy proximal spines.

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decidedly clubbed, intercalated triangle small but moderately well developed. Tegmina and wings fully developed in both sexes.[35])

5. **Eudromiella** new genus

FF. Tegmina with discoidal sectors longitudinal. Dorsal surface of male abdomen unspecialized.

G. Form very broad. Wings with costal veins not clubbed, anterior field moderately narrow, intercalated triangle small.

9. **Platylestes** Hebard

GG. Form slender but very compact. Wings with costal veins clubbed, anterior field very narrow, intercalated triangle rather strongly developed. (Head with vertex convex, interocular space wide. Pronotum strongly convex for the group.)

10. **Chromatonotus** new genus

EE. Tarsal claws asymmetrical, the cephalic much shorter than the caudal. (Tegmina with discoidal sectors oblique. Dorsal surface of male abdomen specialized. Wings with costal veins weakly or hardly at all clubbed, intercalated triangle very small.)

F. Form broad. Tegmina moderately broad. General coloration pale. Abdomen of male conspicuously constricted beyond sixth dorsal segment.....6. **Latiblattella** Hebard

FF. Form very broad. Tegmina broad. General coloration rich and rather dark. Abdomen of male not as conspicuously constricted beyond sixth segment.....7. **Antitheton** Hebard

BB. Tarsal claws strongly specialized. Interocular space showing a transverse ridge. (Pulvilli on four proximal tarsal joints. Arolia present. Decrease in size of spines of ventro-cephalic margin of cephalic femora not as decided as is usual for the species showing "type B" armament, with two heavy distal spines. Tegmina with discoidal sectors longitudinal. Dorsal surface of male abdomen unspecialized. Wings with costal veins clubbed distad, intercalated triangle small. Interocular space narrow. Tegmina and wings fully developed.[36])

15. **Lophometopum** new genus

AA. Ventro-cephalic margin of cephalic femora with a row of spines which decrease gradually in size, termed "type A." (Pulvilli on four proximal tarsal joints. Arolia present.)

B. Tegmina with discoidal sectors oblique. (Tarsal claws unspecialized.)

C. Wings with costal veins not clubbed, ulnar vein with a great number of branches, intercalated triangle subobsolete. Dorsal surface of male abdomen unspecialized. (Ventro-cephalic margin of cephalic femora with three heavy distal spines. Tegmina and wings fully developed.[37])

8. **Macrophyllodromia** Saussure and Zehntner

[35] The distal row of spines on the ventro-cephalic margin of the cephalic femora in this genus is composed of spines which are best termed subchaetiform; these spines are very small but not as hair-like as is characteristic of the species showing "type B" armament.

[36] The female sex for this genus is unknown.

[37] The female sex for this genus may still be unknown.

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CC. Wings with costal veins clubbed, ulnar vein with few branches, intercalated triangle present. Dorsal surface of male abdomen specialized.

D. Interocular space narrow, wrinkled. Ventro-caudal margin of cephalic femora armed (with four and one distal spines). Wings with costal veins very strongly clubbed, intercalated triangle well developed for the group, moderately large, radiate field exceptionally ample. Tegmina and wings fully developed in both sexes. (Ventro-cephalic margin of cephalic femora with two, approaching three, heavy distal spines.)

11. **Rhytidometopum** new genus

DD. Inter-ocular-ocellar area raised and flattened, particularly in male. Ventro-caudal margin of cephalic femora unarmed. Wings with costal veins feebly clubbed, intercalated triangle small, radiate field normal. Tegmina and wings fully developed in male, reduced in female. (Ventro-cephalic margin of cephalic femora with two heavy distal spines.)

12. **Supella** Shelford

BB. Tegmina with discoidal sectors longitudinal. (Wings with intercalated triangle small. Tegmina and wings fully developed in male,[38] fully developed or slightly reduced in female.)

C. Ventro-cephalic margin of cephalic femora with two heavy distal spines. Tarsal claws specialized.

D. Size small for group. Ventro-caudal margin of cephalic femora with two and one distal spines. (Dorsal surface of male abdomen unspecialized.)

13. **Cariblatta** Hebard

DD. Size larger, medium small to large for group. Ventro-caudal margin of cephalic femora with three or more and one distal spines. (Dorsal surface of male abdomen unspecialized or specialized.[39]) . . 14. **Neoblattella** Shelford

CC. Ventro-cephalic margin of cephalic femora with three heavy distal spines. Tarsal claws unspecialized. (Dorsal surface of male abdomen highly specialized.) . . . . . 16. **Blattella** Caudell

Euthlastoblatta compsa[40] new species (Plate II, figures 10 and 11.)

This species represents a group of the present genus, of which we have two additional undescribed Central American species before us, differing from what we may term the Abortiva Group, in the absence of a striking pale transverse band toward the caudal margin of the pronotum and the fact that the most striking male genitalic specialization occurs in the styles.

Compared with males of *E. abortiva* (Caudell), those of the present species are found to differ also in the narrower interocular

[38] Except in *Cariblatta lutea minima* Hebard.

[39] Among the many species of *Neoblattella*, the males of *nahua* (Saussure) and *fraterna* (Saussure and Zehntner) alone are known to have the dorsal surface of the abdomen specialized.

[40] From κομψή = neat.

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space, more deplanate face,[41] cephalic femora with ventro-cephalic margins showing intermediate spines grading from the heavy proximal to the piliform distal series, longer pronotum with extensive mesal area unicolorous and lateral margins narrower and transparent, more elongate distal enlarged portions of the costal veins of the wings and slightly more produced, but still strongly transverse, supra-anal plate.

Type.— ♂; Gatun, Canal Zone, Panama. July 25 to 31, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 432.]

Size medium small, form moderately slender, structure very delicate; much as in *abortiva*. Interocular width about one-third that between the antennal sockets, ocellar spots distinct but irregular, face strongly flattened. Maxillary palpi elongate, with distal joint decidedly enlarged. Pronotum very weakly convex, showing weak but distinct medio-cephalic and latero-caudal flattening; lateral margins very narrow, transparent, very weakly declivent, curving upward to weakly cingulate margins; outline elliptical, showing a decided caudal truncation, point of greatest width mesad. Tegmina and wings fully developed, extremely delicate in structure, with numerous discoidal sectors (twelve) oblique; area of dextral tegmen concealed when at rest, less suffused and with cross-veinlets more decided. Wings with costal veins (eight) elongate clavate distad, beyond these the remaining costal veins are not clavate but fork frequently distad; intercalated triangle small. Dorsal surface of abdomen unspecialized.

Supra-anal plate strongly transverse, but with free margin obtuse-angulate, with apex broadly rounded.[42] Subgenital plate convex; lateral margins convergent and feebly concave in proximal third, remaining third occupied by the broad basal portions of the heavy and deeply inset styles, leaving between these only a narrow aciculate produced median portion of the plate. Styles symmetrical, heavy, broad at bases, with external surfaces there deplanate, thence tapering to the cylindrical and bluntly rounded distal portions which are directed caudad and are nearly attingent, these produced distal portions armed on their dorsal surfaces with a few stout, minute, chitinous spines directed caudad.

Cephalic femora with ventro-cephalic margin armed proximad with heavy elongate spines, which decrease gradually in size and length distad to a row of minute chaetiform spines, terminated by two heavy spines, elongate in increasing ratio distad; ventro-caudal margin armed with a single medio-distal and a single distal spine. Other femoral margins armed with moderately strong spines. Elongate tarsi with a single pulvillus occupying the ventral surface of the fourth joint. Arolia present, distinct but small, as in *abortiva*.

[41] In this feature approaching the condition found in some species of *Neoblattella*.

[42] As but two males of this species are known and the organs of the anal chamber are only partly visible, we do not describe them in detail. We can, however, state that the concealed genitalia are much more simple than in *abortiva*, without the remarkably specialized organ found in that species.

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Coloration dark. Head with occiput, to just above ocelli, deep bay; eyes blackish; ocelli buffy; face ochraceous-buff, shading through ochraceous-orange to ochraceous-tawny mesad toward clypeus. Antennae and maxillary palpi prout's brown. Pronotum solid shining blackish brown, except narrow lateral margins which are transparent, faintly tinged with buffy. Tegmina translucent, blackish brown, shading to dresden brown distad and in area of dextral tegmen concealed when at rest; marginal field transparent, faintly tinged with buffy. Wings hyaline, faintly tinged with brown, except in area of costal veins and distal portion of anterior field, where the suffusion is more decided, dresden brown, reaching the maximum in the area of the enlarged costal veins, there translucent, deep prout's brown. Dorsal surface of abdomen buffy, heavily tinged with blackish brown, this suffusion solid on supra-anal plate and preceding segment. Cerci blackish brown, except mesodorsal area which is dresden brown. Ventral surface of insect suffused laterad with blackish brown; remaining portions of coxae and the limbs translucent, buckthorn brown, except dorsal margins of the femora, tibiae and tarsi, which are suffused with blackish brown. Ventral surface of abdomen ochraceous-buff with an orange tinge, suffused with ochraceous-tawny, except narrowly laterad, where brief but decided suffusions of blackish brown occur on each segment.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type.....	9.8	2.8	3.7	10.3	3.5
Paratype.....	9.7	2.7	3.7	10.2	3.4

In addition to the type, a single paratypic male, bearing the same data, but taken July 28 to August 5, 1916, is before us. This specimen fully agrees with the type.

Two small immature examples from Gatun, and one from Porto Bello, are probably referable to the present species.

Ceratinoptera picta Brunner

1865. *Ceratinoptera picta* Brunner, Nouv. Syst. Blatt., p. 76, pl. i, figs. 4 *a* to 4 *e*. [♂, ♀; Brazil.]

Gatun, Canal Zone, Panama, VII, 15 to VIII, 5, 1916, (Harrower), 1 ♀ with ootheca, 1 small juv.

Rio Trinidad, Pan., V, 1 to 5, 1911, (Busck), 3 ♀, (2 with reduced tegmina, 1 with fully developed tegmina).

Tabernilla, C. Z., Pan., VII, 20, 1907, (Busck) 1 ♀, (with fully developed tegmina).

Cabima, Pan., V, 22 and 24, 1911, (Busck), 1 ♂, 2 ♀, (1 ♂, 1 ♀, with reduced tegmina; 1 ♀, with fully developed tegmina).

In the male before us the tegminal length is 8.7 mm., in the females it ranges from 4.9 to 8.7 mm.

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'The entire series at hand have the pronotum solidly blackish chestnut, excepting the female with reduced tegmina from Cabima, which has the lateral margins narrowly translucent, this becoming wider latero-caudad and the disk slightly paler meso-caudad than in the other portions.

The distal margin of the supra-anal plate of the male at hand is broadly obtuse-angulate emarginate mesad, with angles rounded, while the styles of the subgenital plate are crowded together mesad in a deep rounded emargination. These features would usually indicate specific differentiation in the Blattidae, but we feel certain are, in the present case, ascribable to individual variation only. Both the present insect and *C. nahua* (Saussure) we know now to vary individually to an exceptional degree. Though the tegminal and wing variation in these species is very considerable, no individuals of either species show any trace of transverse truncation, accompanying the tegminal reduction, as is found in the Mexican *C. tropaia* Hebard.

In one female the ootheca, though over half extruded, is, except immediately at the suture, covered by a mantle, evidently soft in life, supplied with scattered hairs. In another individual the ootheca, half extruded, shows no covering mantle and is seen to have its sides supplied with low and rather widely spaced longitudinal ridges. The suture of the ootheca is supplied with rather widely separated nodes, each of which has its dorsal surface raised in the form of the sign for division (÷). It will be noted that this is in some respects comparable to the oothecae of the species of *Anaplecta* discussed in the present paper, though of less specialized shape, no vertical divisions being apparent, while the suture is very much weaker and more simple.

Dendroblatta sobrina Rehn (Plate II, figures 12 and 13.)

1916. *Dendroblatta sobrina* Rehn, Trans. Am. Ent. Soc., xlii, p. 232, pl. xiv, figs. 11 to 14. [♂, ♀: Chinandega, Nicaragua; Pózo Azúl, Costa Rica; Corozal and Old Panama, Panama; Porto Velho, Brazil.]

Rio Trinidad, Panama, III, 28 to V, 5, 1911 and 1912, (Busck), 5 ♂, 1 ♀, 4 juv.

Corozal, Canal Zone, Pan., II, 12, 1911, (Busck), 1 ♀; XI, 17, 1913, (Hebard; colony of adults and young on tree trunks in clearing, the Mantid, *Liturgousa cayennensis* Saussure also there), 3 ♂, 1 ♀, *paratypes*, 2 small juv.

Old Panama, Pan., XI, 13, 1913, (Hebard; running about on surface of fallen tree trunk), 1 ♀, *paratype*.

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Panama, Pan., VI, 1915, (Harrower), 1 small juv.
Chorrera, Pan., V, 2, 1911, (Busck), 1 ♀.

From the material at hand we would note that, in addition to the male genitalic features given in the original description, the dextral lobe of the subgenital plate is concave on its internal surface, covering a very thin chitinous plate of almost equal size, the distal margin of which is convex and armed with heavy curved dentiform spines. In part of the individuals examined this inner plate is concealed completely by the dextral lobe.

These beautiful insects were found to be remarkably agile, running with great rapidity over the tree trunks. When pursued, the adults sometimes took flight, but always returned to the tree they had just quitted. Both adults and young would at times suddenly arrest their movements, their striking coloration then blending astonishingly with the tree trunk upon which they were resting.

One female is at hand bearing an almost completely extruded ootheca, with suture laterad. The ootheca is very thin, subrectangulate in form, the dorsal and ventral margins showing very slight arcuation, approximately 6 millimeters long and 2.9 millimeters wide. The dorsal third is strongly compressed with margin (suture) bearing regular, well separated, small nodes, each of which shows a brief transverse ridge on its dorsal surface. The surface of the ootheca is microscopically very finely and longitudinally substriate, giving a smooth bark-like appearance; the vertical divisions are subobsolete, about ten in number.

The young of this handsome insect are buffy, very strikingly marked with dark brown in a pattern of coloration very different from that of the adult (see plate II, fig. 13). It is interesting to note that this pattern, though having distinctive features, is in many ways much more similar to that found in *Aglaopteryx gemma* Hebard[43] and *Aglaopteryx diaphana* (Fabricius). We would further note the coloration of *Aglaopteryx lita*, here described, the adult of which species shows a type of coloration more suggestive of that of adults of the present species, than of the adults of the two other known species of that genus.

[43] Described; Mem. Am. Ent. Soc., 2, p. 34, pl. 1, fig. 9, (1917).

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From these observations we may conclude that the general color type found in immatures of the present species and in adults of *A. gemma* and *A. diaphana* is very primitive, and that these genera thus show their common ancestral stock. Weight is added to the latter deduction by the discovery of *A. lita*, a species which has developed an utterly distinct color pattern, at least in the adult, from the other species of that genus, in some ways rather suggesting that of the present species.

Aglaopteryx lita[44] new species (Plate II, figures 14 and 15.)

The present beautiful species differs very widely from *A. diaphana* (Fabricius), with which it agrees more closely in the tegminal development than with the genotype *A. gemma* Hebard, in its striking and distinctive color and color pattern, slightly narrower interocular space and caudal metatarsus, which is not distinctly longer than the combined length of the succeeding tarsal joints, as in that species.

Type.— ♀; Cabima, Panama. May 18, 1911. (A. Busck.) [United States National Museum.]

Size large for this genus of small species; form robust; structure less delicate than in *diaphana*. Head broad, eyes separated a distance distinctly over half that between the antennal sockets; very small ocellar spots apparent, but not well defined: Maxillary palpi heavy. Pronotum with surface evenly and distinctly convex; margin convex to the broadly rounded and sub-rectangulate latero-caudal angles, showing a distinct flattening of this convexity over the head, caudal margin transverse, showing an extremely feeble convexity. Tegmina reaching to apex of abdomen, strongly chitinous, smooth, the veins very inconspicuous, the discoidal sectors oblique. Wings, though greatly reduced, with numerous and somewhat irregular costal veins, not enlarged distad; median vein forking distad; ulnar vein with two complete but short and distal rami; the discoidal, median and ulnar veins and the rami of the latter connected by transverse veins of nearly the same heaviness; intercalated triangle very small but distinct.

Supra-anal plate transverse, about two and one-half times as broad as long, triangular with apex broadly rounded and incised. Cerci submoniliform, hairy, tapering distad to acute apex, about three and one-half times as long as broad, with eleven appreciable joints, flattened above, convex below with sutures distinct and lateral margins flattened. Subgenital plate very broad, convex; free margin broadly convex except at cerci, where it is broadly and very weakly concave. Limbs heavy and armed as is characteristic of the genus. Ventro-caudal margin of cephalic femora armed with two, and one distal, spines. Length of caudal metatarsus equals combined length of succeeding tarsal joints. Tarsal arolia and pulvilli absent; claws unspecialized, as typical for the genus.

[44] From λιτή = smooth.

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Color.—Surface smooth and shining. Head deep bay, ocellar spots minute buffy dots, antennae bay except proximad where they shade to buffy. Pronotum entirely blackish bay, except lateral margins which are ochraceous-buff tinged with ochraceous-tawny, these broadest toward latero-caudal portions of disk. Mesonotum, metanotum and first abdominal segments tawny, this continued mesad on each side of the three succeeding segments as a broad suffusion into the remaining darker, blackish brown, dorsal surface of the abdomen, with the exception of a brief lateral area on each side of the sixth and seventh segments of light ochraceous-buff, these forming a very distinctive buff marking latero-caudad, without, but just preceding, the cercal bases. Tegmina blackish bay distinctively marked with ochraceous-buff, the borders of these pale areas ochraceous-tawny; pale in proximal half of anal field, entire marginal field continuing beyond along the costal margin to median part of tegmina by invading the scapular field, and a large oval area mesad in the scapular field, the axis of which is oblique. Wings buffy, heavily suffused with prout's brown in distal two-fifths of anterior field, branches of axillary vein prout's brown, distal portion of radiate veins tinged with this color. Limbs buffy, with spines and tarsi tawny. Cerci cinnamon brown.

Length of body, 9; length of pronotum, 3.2; width of pronotum, 4.3; length of tegmen, 6.5; width of tegmen, 2.95; length of cercus, 1.9; length of caudal tibia, 3.55; length of caudal metatarsus, 1.65 mm.

The type is unique.

EUDROMIELLA new genus

The single known species of this genus suggests, in its form and delicate structure, species of the genera *Euthlastoblatta* Hebard and *Rhytidometopum*, here described. The bilineate pronotum is a type familiar in *Blattella germanica* (Linnaeus) and many other species of the Group Blattellites.

This genus shows nearest affinity to *Latiblattella* Hebard, differing in the characters of major importance in having the form not as broad; the vertex well rounded, not slightly flattened; the face more convex; both sexes with equally fully developed organs of flight; the tegminal discoidal sectors decidedly, not moderately, oblique; the costal veins of the wings heavily, not very weakly or hardly at all clubbed distad, and the male abdomen less decidedly constricted beyond the specialized sixth dorsal segment.

In linear arrangement this genus comes after *Aglaopteryx* Hebard and before *Latiblattella* Hebard. This is a complex type, sharing features with many diverse genera, such as are so often found among the Blattidae.

The genus is monotypic. GENOTYPE: *Eudromiella bicolorata* new species.

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Generic Description.—Size and form medium for the group, structure very delicate. Interocular space moderately wide. Occiput rounding evenly into inter-ocular-ocellar area, which is not strikingly flattened; face not strongly convex with lateral margins rather strongly convergent to clypeal suture. Distal joint of maxillary palpus large, but not as long as preceding joint. Pronotal surface weakly convex. Tegmina and wings fully developed in both sexes; tegminal discoidal sectors decidedly oblique. Wings with costal veins heavily clubbed distad, intercalated triangle not large but moderately conspicuous. Dorsal surface of male abdomen with sixth segment specialized; concealed genitalia complex; subgenital plate asymmetrical.

Ventro-cephalic margin of cephalic femora armed with a series of well spaced long heavy spines, succeeded by a series of closely set chaetiform spines (type B), terminating in three heavy spines, very elongate in increasing ratio distad. Ventro-caudal margin of cephalic femora armed in distal third with well spaced (three and one distal) heavy spines. Other ventral femoral margins well supplied with heavy elongate spines. Four proximal tarsal joints supplied ventro-distad with small pulvilli, these slightly produced caudad but with apices rounded, not acute. Tarsal claws unspecialized. Moderately well developed arolia present.

Eudromiella bicolorata new species (Plate II, figures 16 to 20.)

The pale vertex and darkened face, strikingly bilineate pronotum, bicolored tegmina and wings with area of enlarged portion of costal veins whitish, are distinctive features of coloration in this small roach.

Type.—♂; Tabernilla, Canal Zone, Panama. June 4, 1907. (A. Busck.) [United States National Museum.]

In addition to the generic features already given, we would note the following. Interocular space about three-quarters as wide as that between antennal sockets. Ocellar spots distinct, these areas showing no delimiting contour. Third joint of maxillary palpi very slightly longer than fourth, fifth (distal) joint enlarged, very slightly shorter than (in the series, to as long as) the fourth. Tegmina with numerous discoidal sectors (in the series nine to fourteen, the latter number due to distal branching). Wings with (five to seven) branches of the ulnar vein, intercalated triangle small but distinct, its width appreciably less than its depth. Sixth dorsal abdominal segment with a decided median concavity, having on the caudal face a minute but strongly developed semicircular ridge, cephalad of which is a

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heavy tuft of agglutinated hairs, with moderately numerous other hairs scattered about laterad on the floor of the median depression; seventh and eighth segments transversely narrower, exposed only narrowly along their caudal margins.

Supra-anal plate decidedly transverse, basal width four times length, feebly triangular with apex sub-bilobate. Cerci small, slender, tapering in distal portion only to acute apex; dorsal surface flattened, much less convex than ventral surface; joints strongly defined, lateral margins of each convex, particularly distad. Concealed genitalia complex: mesad a very heavy elongate chitinous process directed caudad is apparent, tapering and curving weakly to its aciculate apex, sinistrad of which is a large chitinous plate; above is situated a much smaller aciculate process and dextrad a plate of similar length which is rounded at its broad apex. Subgenital plate asymmetrical; produced and broadly subchitinous from the caudal margin, developing into heavy and chitinous plates toward the internal margins of the two productions thus formed (the fused and specialized styles), the sinistral longer than broad, tapering very slightly but with apex very broad and rounded; the dextral heavier, more irregular, of approximately the same length but not over half as broad as long; the apices of these well separated plates curving outward, as do the much smaller and attingent, but analogous, plates in males of the genus *Latiblattella*. The brief mesal portion of the distal margin of the subgenital plate between these plates is produced in a minute subchitinous rounded plate with caudal surface deeply concave.[45]

Head ochraceous-buff; occiput showing very faintly four very broad vertical markings of darker shade; eyes and inter-ocular-ocellar area chestnut brown, this continued as a broad suffused band to near apex of labrum, with a pair of buffy dashes ventrad on face. Pronotum with two broad longitudinal bars of blackish chestnut brown, which broaden and diverge slightly caudad throughout their length; intervening area ochraceous-buff with a faint tinge of orange, showing in very faint lines and dots of darker coloration the deep-seated lyrate pattern found well developed in such genera as *Cariblatta* Hebard, *Neoblattella* Shelford and others;[46] lateral margins translucent, ochraceous-buff. Tegmina translucent, ochraceous-tawny, deepening to a line of cinnamon brown running down the humeral trunk, thence straight to the apex of the tegmen, thus bisecting the costal veins, remaining costal marginal portions translucent, ochraceous-buff. Wings faintly tinged with prout's brown, this heavy in proximal area of costal veins and in distal portion of anterior field, ulnar and axillary veins and their branches prout's brown. Abdomen with dorsal surface dark brown mesad, excepting margins of segments which are

[45] Some variation in these appendages is to be expected from their partially subchitinous structure and decided asymmetry, while the fact that both the large plates (styles) are mobile will result in their being found individually in different positions. This is shown by the paratypic material at hand.

[46] A large immature specimen at hand shows that the dark bands are not developed in this species until just before or when the adult condition is reached. This specimen has the pronotal disk showing a lyrate pattern, broken up by twin blotches cephalad and more widely separated blotches mesad, of dark brown.

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ochraceous-buff. Underparts, cerci and limbs ochraceous-buff, abdomen suffused proximad and laterad on succeeding segments with dark brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tabernilla, *type*	9.7	2.7	3.7	10.7	3.1
Tabernilla, *paratype*	9.6	2.8	3.8	10.8	3.2
Empire, *paratype*.....	—	2.6	3.7	9	3
Taboga Island, *paratype* .	—	2.9	3.8	10.9	3.6

The width of the intercalated triangle is 1.65 to 1.7 mm.

In addition to the type the following paratypes are before us.

Tabernilla, Canal Zone, Panama, VI, 10, 1907, (Busck), 1 ♂.

Empire, C.Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂.

Taboga Island, Pan., VI, 11, 1911, (Busck), 1 ♂.

Latiblattella inornata new species (Plate II. figure 21.)

Related to *L. pavida* (Rehn),[47] agreeing in the immaculate coloration and general character of the male subgenital plate; differing in the smaller size, immaculate inter-ocular-ocellar area and, in the male, in the shorter and decidedly heavier styles, with more slender internal process at base of sinistral style, which is nearly as long as that style and reaches nearly to its apex,[48] and in the mesal produced portion of the subgenital plate which is not curled upward along the distal margin.

Type.— ♂; Rio Bejuco, Panama. (W. Schaus.) [United States National Museum.]

Size and form slightly less ample than in any of the described species of *Latiblattella*. Head with interocular space approximately two-thirds as wide as that between the antennal sockets; inter-ocular-ocellar area distinctly flattened; ocelli distinct. Maxillary palpi with third and fifth (distal) joints elongate, each decidedly longer than fourth joint. Pronotum with angles broadly rounded; point of greatest width meso-caudad; caudal margin very feebly convex, truncate. Tegmina with numerous discoidal sectors (twelve) weakly oblique to caudal margin. Wings with costal veins scarcely enlarged distad.

[47] The insufficient descriptions, applicable to but one sex of the two described as *vitrea* by Brunner and to *chichimeca* and *maya* of Saussure and Zehntner, leave us in no doubt as to their being members of *Latiblattella*, but in complete ignorance as far as the most important specific diagnostic characters are concerned. All are apparently distinctly heavier species than *inornata*, as is true also for *alaris* Saussure and Zehntner, which, from the description, can not be generically assigned without considerable doubt.

[48] In *pavida*, this process is only slightly more than half as long as the sinistral style.

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Abdomen with proximal dorsal segments unspecialized; sixth with a semicircular mesal area, formed cephalad by a convex ridge and laterad by the weakly convex margins of very suddenly and deeply impressed longitudinal areas, caudad of the cephalic ridge is a narrow, transverse, feebly obtuse-angulate plate, with free caudal margin supplied with a few hairs, caudad of this the median portion of the specialized area is raised in a large blunt process, with lateral margins concave and divergent caudad and dorsal surface clothed with a heavy tuft of hairs radiating cephalad, caudad of this the narrow distal portion of the segment is subchitinous in texture, the caudal margin transverse, but with latero-caudal angles moderately acute-angulate produced, with apex bluntly rounded; seventh segment longitudinally brief, transversely moderately constricted; eighth segment much the same, but with caudal margin sinuous.

Supra-anal plate transverse, triangularly weakly produced, with apex broad and briefly bilobate. Concealed genitalia: soft integument almost completely fills the anal chamber, from which projects mesad a short, flattened, chitinous lobe, with surface microscopically shagreenous and with disto-dextral angle produced in a short spine, which curves feebly sinistrad at its sharp apex; ventrad of this process the integument is produced in a straight, elongate process, tapering evenly to the acute apex, with dextral margin subchitinous. Dextrad, beneath the dextral cercus, an elongate, lanceolate, chitinous process extends meso-caudad, with surface heavily clothed with a microscopic velvety pile. Subgenital plate not large, somewhat asymmetrical; brief lateral margins convex to bases of heavy, elongate, inset styles, between which the brief and delicate meso-caudal portion of the plate is deplanate, weakly produced with free margin weakly convex. Styles stout, elongate, flattened cylindrical, convergent, with immediate apices rounded and curved outward and supplied with a few hairs; dextral style considerably larger than sinistral. Mesad, at base of sinistral style, a moderately stout, flattened cylindrical process curves mesad, thence nearly straight caudad, with immediate apex rounded, not enlarged and curving sinistrad, the median portion with dorsal surface feebly convex and ventral surface deplanate, the ventral margins thus formed microscopically serrate. Limbs and their armament, character of pulvilli and arolia, typical for the genus.[49] Tarsal claws of unequal length, as characteristic for the genus, elongate and slender, the shorter extending well beyond the moderately well developed arolium.

Allotype.— ♀ ;[50] Steamship Tenadores, en route New York to Jamaica. October 19, 1913. (Hebard; alive in hold.) [Hebard Collection.]

Agrees with type, except in the following features. Form decidedly broader, pronotum more ample. Tegmina and wings distinctly less elongate, but extending well beyond the cercal apices. Dorsal surface of abdomen unspecialized. Supra-

[49] Described: Mem. Am. Ent. Soc., 2, p. 38, (1917).

[50] This specimen was very probably taken on at Bocas del Toro, Panama, or Limon, Costa Rica, as these were the ports at which fruit had last been loaded.

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anal plate moderately triangularly produced, with lateral margins feebly concave, deeply concave emarginate at apex. Subgenital plate rather strongly convex, very feebly fissate meso-distad, free margin in large part convex, showing a broad but feeble concavity at the point of extrusion of the cerci.

The female sex is very similar to that of *L. pavida*, distinguishable only by the immaculate cephalic coloration and the less ample, narrower pronotum.

General coloration of type buffy, tinged with buckthorn brown. Head ochraceous-buff, ocelli paler, eyes blackish brown. Pronotum, with disk ochraceous-buff mottled with buckthorn brown, with a few symmetrically placed but weakly defined dots of prout's brown; margins transparent, very weakly tinged with buckthorn brown. Tegmina transparent, weakly tinged with buckthorn brown. Wings hyaline, showing a very feeble iridescence, distal area of anterior field weakly tinged with buckthorn brown. Body and limbs light ochraceous-buff shading to ochraceous-buff, the dorsal surface of the abdomen tinged laterad with buckthorn brown, mesal specialization of sixth segment cinnamon brown with hairs tawny.

The female is generally similar in coloration. The general coloration shows a slightly more tawny tinge, the disk of the pronotum being more tawny with fewer dark dots.[51] The dorsal surface of the abdomen is more heavily and extensively suffused, mummy brown distad, the lateral margins narrowly outlined in light ochraceous-buff.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	13	3	4.1	12.3	3.8
♀					
Allotype	10	3.3	4.6	11.4	3.8

The pair is unique.

Latiblattella angustifrons new species (Plate II, figure 22.)

Closely related to the preceding species, *L. inornata*, the males agreeing in size, coloration of pronotum and tegmina and general character of male subgenital plate; differing particularly in the narrower interocular space, shorter and heavier process at the base of the sinistral style, decidedly shorter and heavier tarsal claws and somewhat smaller arolium (compare figures 21 and 22, Plate II.)[52]

[51] In these features, closely agreeing with the type series of *pavida* before us. In that species a weak buffy marking is present mesad between the antennal sockets, margined laterad with a somewhat darker suffusion than the general coloration of the face.

[52] The dark longitudinal markings of the vertex, suffusion of the face and the shorter tegmina and wings, with veins of the latter darkened, may represent additional specific diagnostic features, or may prove to be due to mere individual variation. This can be determined only when series of the insect have been obtained.

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Type.—♂; Porto Bello, Panama. February 18, 1911. (A. Busck.) [United States National Museum.]

Agrees with *inornata*, as described, except in the following features. Head with interocular space slightly less than one-half as wide as that between the antennal sockets.[53] Tegmina and wings slightly shorter than in *inornata*. Wing veins darkened; costal veins showing distinct distal enlargement.[54] Concealed genitalia:[55] the mesal projecting lobe is subchitinous and the lanceolate dextral process shows no velvety pile. Subgenital plate as described for *inornata* except for the following feature; mesad at base of sinistral style, a stout cylindrical process curves in an even arc, so that its apex touches the sinistral style; the brief mesocaudal portion of the plate fits in tightly between the styles, its margin curled inward along the dextral style. Tarsal claws of unequal length, as characteristic of the genus, rather short and appreciably stouter than in *inornata*, the shorter not extending beyond the well developed arolium.

General coloration of type buffy, tinged with buckthorn brown. Head with vertex buffy with vertical blackish chestnut stripes, remaining portions, as well as eyes and lateral portions of body and abdomen, shining blackish chestnut, except the ocellar spots and a subocular dot on each side which are buffy. Limbs buffy. Median portion of abdomen and all of subgenital plate ochraceous-tawny. Pronotum with disk ochraceous-buff, mottled with buckthorn brown, with a few symmetrically placed but weakly defined spots of prout's brown, margins of pronotum transparent, very weakly tinged with buckthorn brown. Tegmina transparent, weakly tinged with buckthorn brown, but more heavily so than in *inornata*. Wings hyaline, showing a feeble iridescence, veins translucent dresden brown.

The paratype is less intensively colored, the face having a considerable mesal buffy suffusion, the ventro-lateral portions not darkened and the pronotal markings reduced.

In the maximum recessive condition of coloration it is probable that individuals of this species would show in coloration close similarity to the examples of *inornata* here described.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *type*	11.1	3	4.1	11.3	3.6
Taboga Island, *paratype*.	10.1	2.9	3.8	11.2	3.7

In addition to the type, a single male paratype from Taboga Island, Panama, taken June 14, 1911, by Busck, and two immature males, bearing the same data, but taken June 10 and 11, are before us.

[53] In the paratype even narrower, nearer one-third than one-half as wide.

[54] This is decidedly greater than in *inornata* and aberrant for the genus, in the paratype at hand it is not as marked.

[55] The concealed genitalia appear to have been soft and misshapen in the type, the anal chamber is crushed in the paratype.

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In the immature examples the darker markings, found in the early stages of species of the present genus, are unusually extensive. The disk of the pronotum in one is heavily suffused, in the other with large maculae of blackish chestnut brown meso-laterad and with two smaller and more approximate maculae cephalad of these, the remaining portions buffy. The mesonotum is blackish chestnut brown except for a broad meso-proximal area the caudal margin of which is convex, and lateral portions, which are buffy. The metanotum is buffy, narrowly marked along the caudal margin with blackish chestnut brown. The median and four proximal dorsal abdominal segments are chestnut brown, becoming blackish laterad before the lateral margins, which are buffy brown; the succeeding segments are buffy, the more distal washed with brown. The head is blackish chestnut brown, shading to hazel on the occiput.

MACROPHYLLODROMIA Saussure and Zehntner

1893. *Macrophyllodromia* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 46.

This genus was erected for the single species, *maximiliani*, described by Saussure[56] as a member of the genus *Pseudophyllodromia*. It was apparently considered to be of not more than subgeneric value, but we feel satisfied that not only should it be given full generic status, but also that it represents one of the most distinctive and in some respects most aberrant units of the Group Blattellites.

We have prepared the following generic description, based on the material of the species before us. From the literature we believe that all of the characters here given hold good for *maximiliani*, as the two known species are clearly closely related.

The genus is remarkable among the Blattellites for its relatively large size and unusual wing venation, which resembles much more closely the type found in the genus *Periplaneta*, of the Subfamily Blattinae, than that of any of the Blattellites, showing, however, no incomplete rami of the ulnar vein.

Among the described genera of the Blattellites, we would place *Macrophyllodromia* after *Latiblattella* Hebard and before *Platylestes* Hebard. It agrees with these genera in having three heavy distal spines on the ventro-cephalic margins of the cephalic femora, the

[56] 1873. Mem. Soc. Sci. Phys. Nat. Genève, xxiii, p. 100, pl. x, fig. 35. [Mexico.]

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four proximal tarsal joints with pulvilli, the tarsal claws unspecialized; with *Latiblattella* in the oblique tegminal discoidal sectors; with *Platylestes* in the unspecialized dorsal surface of the male abdomen.

It differs signally from these genera in having the armament of the ventro-cephalic margins of the cephalic femora of "type A," as in *Supella* Shelford. Thus the combination of characters found in this genus is distinctive, but particularly is it differentiated in the wing venation as discussed above.

Generic Description.—Size very large, form moderately broad and structure rather chitinous for the group. Interocular space narrow. Inter-ocular-ocellar area flattened; face transversely rather strongly convex, narrow below the eyes with lateral margins moderately convergent to clypeal suture. Pronotum slightly more convex than is usual in the group. Tegmina and wings fully developed.[67] Tegminal discoidal sectors oblique (sixteen). Wings with costal veins not enlarged distad; discoidal and ulnar veins with a great number of closely placed branches (thirteen to fifteen for the ulnar vein), all of the branches of the ulnar vein complete to the free margin of the wing; intercalated triangle subobsolete. Dorsal surface of male abdomen unspecialized.

Ventro-cephalic margin of cephalic femora armed with a series of moderately elongate heavy spines, which decrease gradually in length mesad, the distal spines only slightly shorter than those proximad, terminating in three heavy elongate distal spines in increasing ratio. Ventro-caudal margin of cephalic femora with a few (four to five) heavy elongate spines. Other femoral margins well supplied with heavy elongate spines. Four proximal tarsal joints supplied ventrad with large distal pulvilli; that of the third caudal tarsal joint occupying almost all, of the fourth joint all, of the ventral surface. Tarsal claws unspecialized. Well developed arolia present.

Macrophyllodromia splendida new species (Plate III, figures 1 to 4.)

The two dark parallel pronotal bars are very striking features in this otherwise generally immaculate insect, which aside from this feature, has some general superficial resemblance to *Neoblattella adspersicollis* (Stål), though of much richer general coloration.

[67] The female sex is unknown for this genus.

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From *M. maximiliani* (Saussure) this insect is easily separated by its smaller size, dark caudal margin of the pronotum and immaculate tegmina.

Type.—♂; Porto Bello, Panama. February 21, 1911. (E. A. Schwarz.) [United States National Museum.]

In addition to the features given in the generic description, we would note the following. Interocular space one-fourth as wide as that between the antennal sockets.[58] Eyes projecting rather decidedly laterad. Ocellar spots rather large, distinct. Maxillary palpi with third joint slightly longer than fourth, fifth (distal) joint about three-quarters as long as fourth, enlarged. Supra-anal plate strongly transverse, basal width nearly six times length, triangular in general outline, briefly cleft meso-distad, with apices thus formed broadly rounded. Cerci elongate lanceolate (with sixteen joints), seventh to fourteenth joints well-defined, each with lateral margins convex.

Subgenital plate asymmetrical; sinistral marginal portion thickened, weakly concave oblique produced to slightly beyond the median point, where it is convex, curving into a deep cleft which extends more than half the distance to the margin of the preceding segment, thus forming a sinistral lobe, with a few minute scattered teeth ventrad on its broadly rounded apex. On this lobe, along the margin at the median cleft of the plate, is a rounded ridge (the sinistral fused and specialized style) which is heaviest at the base of the cleft, its surface supplied with stiff hairs and minute scattered teeth. Dextral margin of subgenital plate showing a strong concavity at the cercus, thence convex to a straight channel which runs across the surface of the plate to the base of the median cleft of the plate, at this point a slight angulate-emargination is formed, from this point the margin is convex and the plate is thickened, thus forming a dextral lobe (the dextral fused and specialized style) not as large and slightly less produced than the sinistral lobe, well supplied with stiff hairs, its sinistral margin forming the margin at the median cleft of the plate. The heavy pair of plates beneath the supra-anal plate are seen to be very large and are all that is visible within the anal orifice in this specimen.

Head with vertex, cheeks (including ocellar spots), antennae and palpi clear ochraceous-buff, the palpi very faintly suffused, with ultimate joint suffused proximad with prout's brown; eyes and inter-ocular-ocellar area shining blackish brown, continued as a broad vertical band with margins sharply defined on face to labral suture. Pronotum with two broad meso-lateral longitudinal bands of blackish brown, which broaden slightly mesad and strongly caudad, there joining and occupying the entire caudal margin; area between these bands clear ochraceous-buff with a strong orange tinge, remaining broad lateral margins of pronotum transparent, very faintly tinged with buckthorn brown. Tegmina translucent, rather strongly tinged with buckthorn brown having a tawny tone, except the costal fields which are transparent, very faintly tinged with buckthorn brown. Wings

[58] The type has the vertex somewhat crushed. These features are more readily seen in the paratype.

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transparent, suffused with brussels brown; suffusion sudan brown in area of ulnar and discoidal veins, becoming still darker, amber brown, toward the costal margin. Dorsal surface proximad cinnamon brown shading to blackish chestnut brown distad, cerci of that color. Underparts and limbs pale ochraceous-tawny, the abdomen becoming cinnamon brown distad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Type.....	15.8	4.7	6.2	20.2	6.2	7.2
Paratype	16.8	4.6	6	18.9	6.3	—

In addition to the type, a single male paratype, taken at the same locality, February 28, 1911, by Busck, is before us.

CHROMATONOTUS[59] new genus

In linear arrangement we place this genus after *Platylestes* Hebard, and before *Rhytidometopum* here described. In general form and structure close resemblance is shown to some of the small species of the genus *Ischnoptera* Burmeister, of the Group Ischnopterites.

Though in size and form exceedingly different from *Platylestes*,[60] these genera agree in having "type B" armament of the ventro-cephalic margins of the cephalic femora with three heavy distal spines, the tegminal discoidal sectors longitudinal, male dorsal abdominal segments unspecialized and four proximal tarsal joints supplied with pulvilli. Signal difference from *Platylestes* is found in the distinctive coloration, much less transverse pronotum, very much narrower tegmina and anterior field of the wings, the well developed intercalated triangle of the wings, more elongate and slender cerci and caudal metatarsi much longer, not distinctly shorter, than the combined length of the succeeding joints.

Though in general appearance much closer to *Rhytidometopum*, very great structural difference is found, these genera in primary features agreeing only in the wings having a well developed intercalated triangle, the tarsal joints having similar pulvilli and the tarsal claws being unarmed.

[59] From χρῶμα and νῶτος. Colored back; in allusion to the fact that in the four species of this genus at hand, all have the pronotum conspicuously and distinctively marked.

[60] See Hebard, Trans. Am. Ent. Soc., xlv, p. 97, pl. xvii, fig. 1, (1919).

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The pronotal type resembles more closely the normal in the Group Ischnopterites than it does that found in the related genera of the Group Blattellites.

Material representing four species of the genus is before us.[61] GENOTYPE: *Chromatonotus lamprus* new species.

Generic Description.—Size small, form slender, structure not as delicate as is usual in the Group. Interocular space wide; vertex rounding evenly into face; ocellar spots in the male sex decided, with flat surfaces oblique to intervening area as in *Ischnoptera*, weakly developed in the female sex; face moderately convex, very brief lateral margins strongly convergent to clypeal suture. Maxillary palpi short, heavy distal joint as long as or longer than any other. Pronotum feebly transverse; surface convex, more so than is usual in the Group Blattellites, much as in some of the smaller species of *Ischnoptera*. Tegmina and wings fully developed in both sexes. Tegmina narrow, discoidal sectors (seven or eight) longitudinal. Wings with anterior field narrow, resultantly short costal veins thickened distad; discoidal and unbranched median vein connected by numerous transverse veinlets; ulnar vein with few (one to (rarely) three) complete branches, showing bases only of transverse veinlets toward fold of the wing; intercalated triangle broad and conspicuous; radiate field ample. Dorsal surface of male abdomen unspecialized; paired plate beneath supra-anal plate highly specialized; subgenital plate asymmetrical.

Limbs rather heavy and short for the Group. Ventro-cephalic margin of cephalic femora armed with a few well-spaced heavy elongate spines, succeeded by a row of minute chaetiform spines, terminating in three heavy and very elongate distal spines in increasing

[61] In addition to the two species here described, we have before us material of the following species from Trinidad:

Chromatonotus infuscatus (Bruner)

1906. *Phyllodromia infuscata* Bruner, Jour. N. Y. Ent. Soc., xiv, p. 139. [Near Port of Spain, Trinidad.]

Chromatonotus notatus (Brunner)

1893. *P[hyllodromia] notata* Brunner, Proc. Zool. Soc. London, 1893, p. 602, pl. lii, figs. 1a, b. [♂, ♀: St. Georges and Balthazar, Grenada, British West Indies.]

1906. *?Phyllodromia notata* Bruner, Jour. N. Y. Ent. Soc., xiv, p. 139. [Near Port of Spain, Trinidad.]

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ratio. Ventro-caudal margin of cephalic femora armed throughout its length with (three or four and one distal) well-spaced heavy spines. Other ventral femoral margins well supplied with heavy elongate spines. Ventral surface of four proximal tarsal joints supplied distad with minute simple pulvilli. Tarsal claws unspecialized. Moderately well-developed arolia present.

Chromatonotus heterus[62] new species (Plate III, figure 5.)

The present insect differs decidedly from the other species of the genus in the distinctive development of the pronotal color pattern and in the relatively shorter tegmina and wings. The male will doubtless show distinctive genitalic features, as do the males of the two species for which this sex is known.

In linear arrangement we would place this species first in the genus, followed by *infuscatus* (Bruner), *notatus* (Brunner) and *lamprus* here described.

The pronotal color pattern in this insect, though less clearly defined, shows a striking similarity to that of *Euthlastoblatta abortiva* (Caudell).

Type.— ♀; Chorrera, Panama. May 11, 1912. (A. Busck.) [United States National Museum.]

In addition to the generic characters given, we would note the following. Size slightly smaller than in *lamprus*, form much as in that species. Interocular space very slightly greater than width between antennal sockets; ocellar spots very small, with area weakly defined, even smaller than in this sex of *lamprus*. Enlarged fifth (distal) joint of maxillary palpus very slightly longer than third joint, decidedly longer than fourth joint. Tegmina and wings proportionately not as elongate as in *lamprus*; wings with greatest width of anterior field about one-fourth its length, short costal veins strongly enlarged distad (eleven), intercalated triangle nearly as wide as deep. Supra-anal and subgenital plates as in this sex of *lamprus*.

Head blackish carob brown. Proximal antennal joint, ocellar spots, mouthparts and maxillary palpi buffy; remaining portions of antennae chestnut brown. Limbs ochraceous-buff tinged with tawny. Ventral surface of abdomen cinnamon brown, deepening to chestnut brown laterad. Pronotum shining, margined narrowly cephalad (though not as narrowly as in *lamprus*) and more broadly laterad with ochraceous-buff, this pale coloration crossing the dark remaining portions of the pronotum as a narrow band just before the caudal margin; leaving the very large meso-cephalic area and caudal margin blackish carob brown, the margins of these dark areas suffused, not sharply defined. Tegmina translucent, evenly and weakly tinged with buckthorn brown. Wings translucent, very weakly tinged with buckthorn brown; costal veins buckthorn brown. Dorsal surface, including

[62] From ἕτερος = different.

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proximal portion of abdomen, shining cinnamon brown, shading in remaining portion of abdomen to blackish brown. Cerci prout's brown.

Length of body, 8.5; length of pronotum, 2.35; width of pronotum, 3; length of tegmen, 8.4; width of tegmen, 2.8; length of caudal tibia, 3.2; length of caudal tarsal joints, 2.8 mm.

The type is unique.

Chromatonotus lamprus[63] new species (Plate III, figures 6 and 7.)

This handsome species is closely related to *C. notatus* (Brunner), differing strikingly only in having the pale margin of the pronotum cephalad much narrower, all but the costal field of the tegmina rather strongly suffused, not having the tegmina with humeral trunk strikingly darker than the remaining portions and in the very differently specialized male genitalia.

Compared with *C. infuscatus* (Bruner), these species are seen to be larger, with pale marking caudad on disk of pronotum strongly transverse; not subcircular with a ray extending cephalad, as is normal in that species.

Type.—♂; Tabernilla, Canal Zone, Panama. May 14, 1907. (A. Busck.) [United States National Museum.]

In addition to the generic characters described, we would note the following. Size (averaging) larger than in *infuscatus*, slightly smaller than in *notatus*. Interocular width equals length of first antennal joint. Ocellar spots large and conspicuous. Enlarged fifth (distal) joint of maxillary palpus equal in length to third joint, slightly longer than fourth joint. Wings with greatest width of anterior field about one-fourth its length; intercalated triangle nearly as wide as deep.

Supra-anal plate feebly transverse, length three-quarters proximal width, free margins straight convergent to distal portion, which is less decidedly chitinous, supplied with long hairs, broadly rounded but with a minute median emargination. Cerci small, elongate and slender (ten to eleven joints), the sutures well marked, the lateral margins of the joints nearly straight, but each (from six to ten) distinctly narrower than its predecessor; dorsal surface flat; ventral surface of each joint strongly convex with very narrowly cingulate lateral margins. Concealed genitalia: paired plate beneath supra-anal plate highly specialized; sinistral half chitinous, flattened against wall of anal orifice, with a small slender process, with apex sharply rounded, situated below base of cercus and directed caudad; dextral half developed into two lobes with apex of each produced in an elongate aciculate projection, these parallel and directed mesad.[64]

[63] From λαμπρὸς = handsome.

[64] In males of the closely related *notatus* the dextral half is developed into a single lobe supplied with numerous short sharp teeth.

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Subgenital plate rather strongly convex, supplied with elongate scattered hairs, free margins evenly and moderately convex-convergent to mesal fourth, which is produced and rather strongly convex, showing a slight angulation mesad; sinistral style minute, simple, cylindrical, feebly tapering to sharply rounded apex, about three times as long as basal width, situated at sinistral base of median produced portion; dextral style similar, except that apex is formed by two minute but stout teeth and with a similar tooth at its base dextrad, this style situated at about the median point on the dextral margin of the median production of the subgenital plate and directed sinistro-caudad.

Allotype.— ♀ ; Cabima, Panama. May 17, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with male in ambisexual features, differing in the following respects. Interocular space distinctly wider, only slightly narrower than width between antennal bases; ocellar spots smaller with area less decidedly defined. Supra-anal plate similar, but less transverse, length slightly less than half proximal width. Subgenital plate very short and truncate, surface convex and supplied with scattered elongate hairs; free margin moderately convex laterad, transverse in broad mesal portion.

Head blackish liver brown, ocellar spots light buff, antennae prout's brown; mouthparts and palpi buffy, the latter with distal segments heavily washed with prout's brown. Pronotum shining, with cephalic margin narrowly[65] and lateral margins more broadly ochraceous-buff; remaining portions blackish carob brown except for a large transverse elongate-ovate marking of ochraceous-buff mesocaudad, this occasionally tinged with orange. Tegmina translucent, suffused with prout's brown, this regularly distributed but deepest at the humeral trunk,[66] except the costal margin which is broadly buffy, the transition to the darker portions of the tegmina gradual. Wings transparent, very weakly tinged with prout's brown, this very heavy in area of costal veins, heavy in area about the intercalated triangle, weakest in the intercalated triangle. Dorsal surface and cerci prout's brown, abdomen margined narrowly laterad with ochraceous-buff. Ventral surface buffy, laterad with coxae and proximal abdominal segments marked with brown, ventral surface of abdomen often washed with ochraceous-tawny. Limbs buffy, spines and tarsal joints beyond metatarsus slightly darker.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tabernilla, *type*	10.7	2.7	3.65	10.4	2.9
Tabernilla, *paratypes* (3).	9.9–10	2.3–2.75	3.1–3.65	10–10.7	2.9–3
Empire, *paratype*.....	—	2.6	3.1	10	3
Corozal , *paratype*.....	9.9	2.65	3.4	10.7	3
♀					
Cabima, *allotype*.....	9	2.75	3.3	9.8	3

In the series the length of the caudal tarsal joints varies from 2.8 to 3 mm.

[65] In *notatus* the cephalic margin of ochraceous-buff is distinctly wider mesad.

[66] In *notatus* the humeral trunk is rich prout's brown, contrasting strongly with the tegmina, which are otherwise as pale or paler than in the present species.

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In addition to the type and allotype the following paratypes are before us.

Tabernilla, Canal Zone, Panama, V, 13 to VI, 16, 1907, (Busck), 3 ♂.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; found dead on ground), 1 ♂.
Corozal, C. Z., Pan., IV, 26, 1911, (Busck), 1 ♂.

RHYTIDOMETOPUM[67] new genus

The single known species of this genus suggests in size, form and delicacy of structure an obscurely colored insect superficially similar to *Euthlastoblatta abortiva* (Caudell).

In the characters of major importance nearest agreement with *Supella* Shelford is found. The present genus has, however, the sexes similar; the interocular space wrinkled, not smooth; the inter-ocular-ocellar area unspecialized, not raised and flattened; the tegminal discoidal sectors moderately, not strongly, oblique, and the wings with the intercalated triangle much more decided and radiate field more ample.

In linear arrangement we place the present genus after *Chromatonotus*, here described, and before *Supella* Shelford. The relationship to both these genera is not at all close. The genus represents one of the complex units, sharing features with many diverse genera, so often found in the Blattidae. Such are manifestly indicative of the great antiquity of this family.

The genus is monotypic. GENOTYPE: *Rhytidometopum megalopterum* new species.

Generic Description.—Size and form medium, structure rather delicate for the Group Blattellites. Interocular space narrow, showing a distinctive transverse wrinkling. Inter-ocular-ocellar area not specialized; face not strongly convex, with lateral margins strongly convergent to clypeal suture. Fifth (distal) joint of maxillary palpi large, longer than preceding joint. Pronotal surface convex, slightly more so than in the usual type in *Neoblattella* Shelford. Tegmina and wings fully developed in both sexes. Tegminal discoidal sectors moderately oblique. Wings with costal veins heavily clubbed distad; intercalated triangle broad and conspicuous; radiate field unusually broad for the Group. Dorsal surface of male abdomen with sixth segment

[67] From ῥῦτίς and μέτωπον, wrinkled forehead.

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specialized; subgenital plate and concealed genitalia complex and asymmetrical.

Ventro-cephalic margin of cephalic femora armed with a series of heavy spines, the distal spines much the shorter and the more closely placed, terminating in two heavy and very elongate distal spines in increasing ratio.[68] Ventro-caudal margin of cephalic femora armed throughout its length with well-spaced heavy spines (four and one distal). Other ventral femoral margins well supplied with heavy elongate spines. Ventral surface of four proximal tarsal joints supplied distad with small pulvilli, the apices of which are sharply rounded. Tarsal claws unspecialized, but with a weak indication of an internal flange. Well developed arolia present.

Rhytidometopum megalopterum new species (Plate III, figures 8 and 9.)

The present insect entirely lacks distinctive markings. The brown of the pronotal disk and tegmina is unusually lustrous and rich in tone.

Type.—♂; Trinidad River, Panama. June 3, 1912. (A. Busck.) [United States National Museum.]

In addition to the generic features already given, we would note the following for the present species. Interocular space two-fifths that between the antennal sockets, very feebly ridged, which ridge shows a number of weak longitudinal creases. Ocellar spots distinct, their areas showing no delimiting contour. Third joint of maxillary palpi slightly longer than fourth, fifth (distal) joint enlarged and in length intermediate between these. Tegmina with numerous discoidal sectors (eight to thirteen in the series, variability due to branching). Wings with (in the series four to six) complete branches of the ulnar vein; intercalated triangle conspicuous, nearly as wide as deep. Sixth dorsal abdominal segment weakly depressed mesad, the depression containing a tuft of agglutinated hairs, seventh and eighth dorsal segments transversely narrower, exposed only very narrowly along their caudal margins.

Supra-anal plate strongly transverse, basal width six times length, distal margin convex between the cerci with an angulation feebly indicated. Cerci small and slender, tapering to acute apex, the joints (twelve) strongly defined, the lateral margin of each convex, particularly distad; dorsal surface only slightly less convex than ventral surface. Paired plate beneath supra-anal plate of male large and unspecialized. Titillator with apex straight, aciculate, directed caudad.

Subgenital plate strongly asymmetrical and irregular; free margin roughly convex, excepting sinistrad where it is broadly and shallowly concave and recurved, to

[68] Occasionally the last spine of the series preceding these is appreciably longer than those before it, thus showing a partial transition toward the forms having three heavy and elongate distal spines.

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which portion of this margin is attached a less heavily chitinous plate, about twice as long as wide, directed dorsad, with margin convex (the sinistral fused and specialized style), thickened along its internal margin, this thickened portion armed distad on its external face with a single blunt tooth; dextrad is attached a less heavily chitinous triangular plate (the dextral fused and specialized style), its internal margin thickened into an elongate irregularly cylindrical process, over twice as long and bulky as the analogous sinistral development, bearing a small aciculate thorn at its base, and with its twisted apex curving caudad with the ventro-caudal margin microscopically but very sharply serrate, these serrations directed proximad.

Allotype.— ♀; same data as type but taken May 6, 1911. [United States National Museum.]

Agrees with male in ambisexual features, differing in the following respects. Size and form similar. Supra-anal plate rather deeply rectangulate-emarginate distad, the two apices thus formed rectangulate, sharply rounded. Subgenital plate very feebly produced beyond cercal bases, short, scoop-shaped, entire.

Coloration similar in the sexes. Head chestnut; ocellar spots, a diffused mediolongitudinal line in the inter-ocular-ocellar area and cheeks ochraceous-tawny. Disk of pronotum rich chestnut, paling in a very small meso-caudal area to ochraceous-tawny; lateral margins transparent, rich buff. Tegmina immaculate, translucent, chestnut when at rest, argus brown when spread; costal field transparent, ochraceous-buff, this continued along the costal margin to near its apex. Wings heavily washed with prout's brown in area of costal veins and in areas of rami of ulnar and axillary veins, radiate field washed less heavily with this color, other portions, including intercalated triangle, very weakly washed with prout's brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Trinidad, *type*.....	9.5	2.8	3.7	10.8	3.4
Tabernilla, *paratype*	10	2.8	3.8	11.2	3.7
Chorrera, *paratype*.....	10.5	2.9	3.65	11	3.8
♀					
Rio Trinidad, *allotype*...	9.5	2.8	3.9	10.7	3.3
Paraiso, *paratype*.....	9	3	4	10.9	3.55
Taboga Island, *paratype*..	9	2.9	3.95	10.8	3.65

The width of the intercalated triangle of the wings ranges from 2.1 to 2.3 mm.

In addition to the type and allotype, the following paratypes are before us.

Tabernilla, Canal Zone, Panama, V, 14, 1907, (Busck), 1 ♂.
Paraiso, C. Z., Pan., I, 22, 1911, (Schwarz), 1 ♀.
Taboga Island, Pan., VI, 9, 1911, (Busck), 1 ♀.
Chorrera, Pan., V, 14, 1912, (Busck), 1 ♂.

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Supella supellectilium (Serville)

1839. *Blatta supellectilium* Serville, Hist. Nat. Ins., Orth., p. 114. [Mauritius.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1916, (Harrower), 5 ♂, 2 ♀, 2 juv. ♀, 2 small juv.

Ancon, C. Z., Pan., III, 1911 and VIII, 31, 1910, (Jennings), 10 ♂, 7 ♀, 2 juv.

In a few males of the present series the tegmina are entirely unicolorous, due to recessive coloration. Two of the fifteen males and nine of the ten females are of intensive coloration.

Cariblatta imitans Hebard

1916. *Cariblatta imitans* Hebard, Trans. Am. Ent. Soc., xlii, p. 180, pl. xi, fig. 20, pl. xii, fig. 21. [♂, ♀; Corozal, Panama.]

Alhajuela, Panama, IV, 18, 1911, (Busck), 1 ♂.

Rio Trinidad, Pan., III, 17 to V, 7, 1911 and 1912, (Busck), 4 ♂, 1 ♀.

Tabernilla, Canal Zone, Pan., VI, 10, 1907, (Busck), 1 ♂.

Paraiso, C. Z., Pan., I, 16, 1911, (Busck), 1 ♂.

Cabima, Pan., V, 17 and 19, 1911, (Busck), 1 ♂, 2 ♀.

Corozal, C. Z., Pan., XI, 14, 1913, (Hebard; dead leaves in jungle), 2 ♂, 2 ♀, *type*, *allotype*, *paratypes*.

Ancon, C. Z., Pan., (Jennings; in bush), 1 ♂.

Panama City, Pan., VI, 1915, (Harrower), 1 ♂.

Tabogilla Island, Pan., II, 16, 1912, (Busck), 1 ♂, 2 ♀, 1 with ootheca.

Taboga Island, Pan., VI, 12, 1911, (Busck), 1 ♂.

This species is distinguished from the Panamanian species of *Neoblattella* by its smaller size, only *N. fratercula* Hebard showing close approach in this respect. Males of that species are easily separated by the very distinct subgenital plate, females by the average slightly larger size and more ample pronotum.

That the present insect is in some ways annectant between the genus *Cariblatta* and the species we have assigned to what we term the second section of the Impar Group of the genus *Neoblattella*, is shown by the close agreement in general structure and in the similar male subgenital plate.[69]

In the present series the discoidal sectors (median vein and its branches and ulnar vein) of the tegmina number four to seven, the variation due to differences in the branching of the median vein. In the anal chamber of the males, below the unspecialized paired

[69] In reference to the genera *Cariblatta* and *Neoblattella*, see Hebard, Trans. Am. Ent. Soc., xlii, p. 148, footnote 3.

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plate under the supra-anal plate, a single small chitinous thorn is found.

NEOBLATTELLA Shelford

The present is one of the largest American genera of the Blattidae. The great variety of species form groups which are distinctive in various ways, a number of these possessing features which, in different groups, show divergence toward different allied genera. Due to the fact that none of the species are strikingly colored, while in tropical America a number of species belonging to the same group may occur at the same locality, it is often difficult to associate the sexes. The males show a most astonishing diversity of genitalic development. In the groups studied, however, the Nahua Group alone shows the dorsal surface of the male abdomen in any way specialized, while in all the species of the genus, the paired plate beneath the male supra-anal plate is unspecialized. Ignorance of the value of genitalic characters alone has made the descriptions of males by past students difficult to work with.

The females, however, show little or no response to such specialization in the opposite sex, and accurate specific determinations can be made only by the most careful study of other, and usually much less distinctive, features of difference, combined with a knowledge of the usual differentiation between the sexes, large series for comparison, and, if possible, field knowledge of at least some of the species.

In the material here under consideration two groups are represented. A third, the Carrikeri Group,[70] undoubtedly occurs in Panama, material of this group from Costa Rica as well as from Colombia being at hand.

Neoblattella fratercula Hebard

1916. *Neoblattella fratercula* Hebard, Ent. News, xxvii, p. 159, figs. 1 and 2. [♂, ♀; Isla de Cocos, Costa Rica.]

The present species is an aberrant member of the Impar Group of the present genus, which group includes a great number of species of medium small size, in which the sexes are but little dissimilar and the tegmina show distinct cross-veinlets, particularly distad.

[70] See Hebard, Trans. Am. Ent. Soc., xlv, p. 100, (1919).

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This insect shows the nearest approach to the forms found in the closely related genus *Cariblatta* Hebard.[71]

Rio Trinidad, Panama, V, 3 and 9, 1911, (Busck), 1 ♂, 1 ♀.
Tabernilla, Canal Zone, Pan., V, 4 and VII, 12, 1907, (Busck), 3 ♀.
Paraiso, C. Z., Pan., I, 15 and 16, 1911, (Busck, Schwarz), 2 ♂.

These specimens are appreciably larger than those of the type series, possibly due to development in a more favorable environment.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Trinidad.....	10.5	2.7	3.6	11.3	3.3
Paraiso.....	9.8	2.6	3.65	11	3.3
Paraiso.....	12	2.8	3.8	11.8	3.7
♀					
Tabernilla (3).....	10.5–11.5	2.75–2.8	3.7–3.7	10.8–11.2	3.3–3.2

Sinistrad within the anal chamber is situated a shaft, directed caudad, which becomes chitinous toward its internal margin and on that margin bears three rather elongate aciculate spines, directed meso-cephalad. This is found to be constant in all the males before us, this including the original series.

Females of this species are very similar indeed to that sex of *N. impar*, *N. panamae* and probably *N. acanthastylata*, all here described. They appear to be separable mainly by the tegmina having the cross-veinlets all distad and inconspicuous and by the smaller pronotum, which probably averages distinctly smaller in this species.

Neoblattella acanthastylata[72] new species (Plate III, figures 10 and 11.)

This interesting species is an annectant type between the aberrant *N. fratercula* Hebard, and the forms of the first section of the Impar Group, which show distinctive specialization about the styles of the male subgenital plate. As in *fratercula*, the tegminal cross-veinlets are only conspicuous in the area of the dextral tegmen, concealed when at rest; in the majority of the species of the Impar Group, the cross-veinlets are conspicuous distad on both tegmina and particularly so in the area mentioned above. In the specialization of the male subgenital plate, the present species shows a very distinctive type.

[71] See remarks under *Cariblatta imitans* on page 52.

[72] From ἄκανθα = spine, and στῦλος = pillar (style); in allusion to the remarkable, though minute, spines at the styles of the male subgenital plate.

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Type.— ♂ ;[73] Gatun, Canal Zone, Panama. July 28 to August 5, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 433.]

Size medium for the group, larger than *fratercula;* form rather slender. Interocular space wide, ocellar spots weakly defined. Maxillary palpi very elongate; third and fourth joints subequal in length; fifth (distal) joint about three-fifths as long as fourth, enlarged, oblique truncate to near its base. Pronotum with surface very weakly convex; the lateral portions very weakly declivent; cephalic and caudal margins truncate, the caudal margin much the broader; lateral margins convex; greatest width slightly caudad of mesal point. Tegmina very delicate; with (six sinistral, seven dextral) longitudinal discoidal sectors; cross-veinlets very weak, except in area of dextral tegmen concealed when at rest, where they are decided. Wings very delicate; proximal (eight) costal veins rather heavily clubbed distad; ulnar vein with (four) complete branches; intercalated triangle small. Abdomen with dorsal surface unspecialized.

Supra-anal plate strongly transverse; weakly triangularly produced, with immediate apex bilobate.[74] Concealed genitalia: a very slender and elongate genital hook is situated dextrad, bent sharply dextrad at the extremely slender, straight distal portion. Subgenital plate produced, roughly scoop-shaped, convex, except latero-distad and meso-distad where it is moderately concave; lateral margins convex before the cercal bases, thence feebly concave and strongly convergent to the distal margin, which is truncate and not more than half as long as the concave portion of one of the lateral margins; two moderately convergent, weakly convex ridges extend from meso-laterad on the plate to the extremities of the distal margin; this margin is occupied by minute, rounded, sub-trigonal styles, directed dorsad and with length of each slightly less than its basal width; at the internal bases of each of these styles, on the internal surface of the subgenital plate, is situated a minute spine, curving feebly dorso-caudad to the aciculate apex, which projects above the adjacent style; immediately cephalad of this spine is situated another similar spine, which curves feebly dorso-cephalad.

Limbs slender. Cephalic femora with ventro-cephalic margin supplied with a series of moderately stout, elongate, proximal spines, which decrease gradually in length to two much longer distal spines, of which the more distal is the longer. Tarsi very elongate; four proximal joints each supplied disto-ventrad with a small pulvillus, which is produced to an acute apex, the shortest (fourth) joint alone has its ventral surface fully occupied by the pulvillus. Moderately large arolia present. Tarsal claws specialized; internal flange well developed, with (two or three) relatively decided but minutely microscopic teeth distad.

General coloration buffy, tinged with tawny olive. Head buffy; with two feeble vertical lines on vertex, a broader band between the eyes and a narrower band, con-

[73] This specimen was unfortunately killed after having very recently reached maturity. The chitin had not fully hardened, and, in consequence, the head is distinctly crushed, while the coloration is clearly more dilute than would be the case in a thoroughly hardened example.

[74] This is probably due to individual variation.

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vex ventrad, between the ocelli, of prout's brown.[75] Pronotum with disk light buff, tinged with warm buff, pictured with delicate lines and small blotches of dresden brown and dots of mummy brown,[76] marginal portions hyaline, with a faint buffy tinge. Tegmina and wings hyaline, with a faint buffy tinge;[77] area of dextral tegmen concealed when at rest, with veins and cross-veinlets very weakly tinged with buckthorn brown. Dorsal surface of abdomen dark prout's brown, with punctations and lateral margins warm buff and surface shading to warm buff meso-cephalad. Supra-anal plate warm buff, broadly suffused with prout's brown meso-laterad. Cerci warm buff, washed with prout's brown at immediate bases. Ventral surface of insect, including limbs, warm buff, narrowly margined laterad with mummy brown from neck to base of subgenital plate; tibiae and tarsi flecked with mummy brown.

Length of body, 10.5; length of pronotum, 2.8; width of pronotum, 3.6; length of tegmen, 12.1; width of tegmen, 3.6 mm.

The type is unique.

Neoblattella panamae new species (Plate III, figure 12.)

The present species is distinctive in the specialization of the male subgenital plate, which shows somewhat closer general similarity to that of *N. acanthastylata*, here described, than to any of the other known species of the Impar Group.

We would further note that the interocular space is very slightly but distinctly wider than in any other species of the Impar Group here considered, while the proportions of the maxillary palpi differ and the tegminal cross-veinlets are more conspicuous and numerous, these appearing as far proximad as the median portion of the anal field.

Type.— ♂; Rio Trinidad, Panama. March 19, 1912. (A. Busck.) [United States National Museum.]

Size and form as in *acanthastylata*. Interocular space extremely wide for the Group, very slightly narrower than that between the antennal sockets;[78] ocellar

[75] This type of coloration is apparently developed in all the the species of the Impar Group, though individually varying from obsolete (maximum recessive) to strongly defined (intensive). Insufficient material is at hand to determine whether, in different species, different degrees of recession or intensification are normal.

[76] This pattern is generally similar to that of *Cariblatta fossicauda* Hebard. Trans. Am. Ent. Soc., xlii, pl. xii, fig. 18, (1916).

[77] The recently emerged condition of the specimen is particularly evident in these organs. When fully hardened, the tegmina would doubtless be tinged with buckthorn brown, as in all the related forms.

[78] In one male paratype narrower, about four-fifths as wide as that between the antennal sockets.

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spots small. Inter-ocular-ocellar area deplanate, weakly defined. Maxillary palpi very elongate; fourth joint about four-fifths as long as third, fifth about two-thirds as long as fourth, shaped as in *acanthastylata*. Pronotum as in *acanthastylata*. Tegmina delicate; with (eight sinistral, eight dextral) longitudinal discoidal sectors; cross-veinlets distinct throughout tegmen, even appearing in distal portion of anal field. Wings delicate; proximal (seven) costal veins briefly but heavily clubbed distad; ulnar vein with (four[79]) complete branches; intercalated triangle small.

Supra-anal plate simple, about one-quarter as long as basal width, free margin broadly convex between cerci with an indentation feebly indicated mesad. Concealed genitalia: dorso-dextrad is a small chitinous lobe with distal surface covered with minute knobs; beneath this is a very elongate slender process, its chitinous apex straight, aciculate, and just before the apex is situated another straight chitinous aciculate projection also directed caudad; beneath this but springing from the sinistral portion of the anal chamber is a very small slender chitinous process with aciculate apex curved dorsad and dorsal margin with two other sharp projections; genital hook of the usual form found in the genus.

Subgenital plate generally symmetrical; free margin on each side slightly thickened and straight to median fourth, where a sudden brief declivity occurs on each side, the remaining median portion of the plate weakly chitinous with margin straight, transverse. The sudden brief declivent portion of the margin sinistrad is occupied dorsad by a minute, simple, very feebly articulate style, which is cylindrical, feebly curved sinistrad and feebly tapering to the rounded apex, with length not three times its basal width; adjacent to this style and occupying the remaining ventral portion of the sinistral declivent portion of the margin is another chitinous projection of very little thickness, which curves dorso-caudad, tapering to its acute apex which reaches exactly as far as the apex of the style, this process armed at its base with one, and along its internal margin with a few (three to five in the series) minute, short but heavy spines. Dextrad the same specialization is found, these processes being, however, slightly smaller, the armed process having usually one less spine. Limbs, armament of same, pulvilli, tarsal claws and arolia as given for *acanthastylata*.

Allotype.— ♀; Porto Bello, Panama. February 15, 1911. (A. Busck.) [United States National Museum.]

This sex very closely resembles females of *N. fratercula* Hebard, *N. impar* here described and probably *N. acanthastylata* here described. We would note that apparently the features of difference, though admittedly not of the differential value usually found, are the abundance of tegminal cross-veinlets, as in the male sex of this species, and the interocular space, which is slightly less than that between the antennal sockets, in this feature very slightly greater than in the females of the

[79] In the paratypes, three to four.

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other species.[80] In other respects this sex agrees with the description of the female allotype of *N. chagrensis*, given in the present paper.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Type	11	2.65	3.65	11.3	3.5
Paratype	10	2.55	3.6	11.1	3.3
Paratype	11.5	2.7	3.6	11.8	3.7
♀					
Allotype	10.8	2.8	3.8	11.8	3.3

The coloration agrees closely with the color description given for *chagrensis* under that species, the only difference being that the head markings are obsolete or subobsolete in the present material. The immature example at hand agrees fully with the adults in coloration.

In addition to the type and allotype the following material is at hand, of which the adults are designated paratypes.

Rio Trinidad, Panama, III, 29, 1912, (Busck), 1 juv.; V, 7, 1911 and VI, 6, 1912, (Busck), 2 ♂.

Neoblattella impar[81] new species (Plate III, figure 13.)

This species should follow *N. panamae* in linear arrangement, the general structure and coloration showing close affinity. The male subgenital plate is, however, of a type in no way comparable to that found in any of the species of the present genus before us, or indeed in any of the forms of the Blattellites.

Type.— ♂; Tabernilla, Canal Zone, Panama. (A. H. Jennings.) [United States National Museum.]

Size and form much like that of *N. acanthastylata*. Inter-ocular-ocellar area deplanate, weakly defined; interocular space moderately wide, four-fifths as wide as that between antennal sockets; ocelli small. Maxillary palpi very elongate, third and fourth joints subequal in length, fifth (distal) joint about two-thirds as long as fourth, enlarged, obliquely truncate to near its base, appreciably more elongate than in *N. acanthastylata*. Pronotum as in *panamae*. Tegmina delicate; with (six to nine, usually seven) longitudinal discoidal sectors; cross-veinlets very weak, except distad and in area of dextral tegmen concealed when at rest, where they are more distinct.

[80] The very slight degree of difference in this feature is realized when we consider that the otherwise similar female of *N. chagrensis*, here described, has the interocular space appreciably narrower than in any of the species here referred to, though in that insect its width is four-fifths that between the antennal sockets.

[81] In allusion to the remarkable, and exceedingly asymmetrical, male subgenital plate.

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Wings delicate; proximal (six) costal veins briefly but heavily clubbed distad; ulnar vein with (five[88]) complete branches; intercalated triangle small.

Supra-anal plate with proximal portion not broad, transversely concave, small meso-distal portion strongly deflexed with surface convex; lateral margins nearly straight, almost transverse, weakly oblique to mesal third of area between cerci, there concave, forming the lateral margins of the produced area, which is subrectangulate, slightly wider than long, with disto-lateral angles broadly rounded and distal portion sub-bilobate.

Concealed genitalia: within the anal chamber and next to the subgenital plate lies a very large, roughly circular, subchitinous mass, concealing the genital hook and surrounding specialized plates; sinistrad above this is a smaller subchitinous plate from which projects a delicate aciculate chitinous process which curves strongly sinistrad; dextrad above the same mass a very elongate, aciculate, feebly undulating chitinous process is directed across the distal portion of the anal chamber, reaching the base of the sinistral style; the paired plate beneath the supra-anal plate is large and simple.

Subgenital plate convex; free margin remarkably asymmetrical, truncate; free margin sinistrad, beyond sinistral cercus, produced in a small, bulbous, acute-angulate process, bearing distad a small cylindrical process, about twice as long as broad, with apex rounded, supplied on its dextral (internal) face with minute, microscopic, chitinous spinulae, from this process to the base of the cercus the free margin is straight, weakly oblique, heavily supplied with larger, microscopic, chitinous spinulae, there produced in a very slender, nearly straight process, about as long as the cercal width, which lies dextrad along the free margin, from the dextral base of this process the margin is continued, straight, weakly oblique, almost to the mesal point, where a sudden and very deep emargination causes this portion to form a large acute-angulate process with apex sharply rounded, directed dextrad, from the base of this angulation the margin is weakly concave, very slightly oblique at the slightly produced dextral extremity, before the dextral cercus, where an acute-angulate projection with apex bluntly rounded and deflexed occurs, its latero-dextral margin straight to base of subgenital plate. Limbs, armament of same, pulvilli, tarsal claws and arolia as given for *acanthastylata*.

Allotype.— ♀; Alhajuela, Panama. May 3, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with the allotypic female of *panamae*, differing in the cross-veinlets of the tegmina, which are much less conspicuous and are confined to the distal portions. Close resemblance to females of *N. fratercula* Hebard is also found, the female of the present insect differing in its larger size and darkened distal veinlets of the tegmina and wings. The great difficulty in separating females of the present group of species is discussed under the allotypic description of the preceding species, *panamae*.

[88] Four in other specimens.

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Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *paratype*....	10.2	2.8	3.3	11	3.2
Alhajuela, *paratypes* (5) .	9.4–11	2.8–2.9	3.5–3.8	11.7–12	3.4–3.7
Tabernilla, *type*.....	11.1	2.9	3.8	12.2	3.7
Rio Trinidad, *paratype* ..	11	2.8	3.7	12	3.4
Rio Bejuco, *paratype* ...	11.2	2.9	3.8	11.8	3.6
♀					
Alhajuela, *allotype*.....	11	3	4	12.5	3.9

General coloration buffy, tinged with buckthorn brown. Head buffy with four vertical lines on occiput, a moderately broad band between eyes, a moderately broad band, convex ventrad, between ocelli and face maculate with blackish brown.[83] Pronotum with disk ochraceous-buff, with suffusions and picturing of tawny and dots of mars brown; in other individuals, instead, chestnut brown and prout's brown: pattern of the same general type as that found in *acanthastylata*. Tegmina transparent, buckthorn brown; area of dextral tegmen concealed when at rest, with veinlets dresden brown. Wings hyaline, with a very faint brownish tinge, this decided, prout's brown, in narrow area between intercalated triangle and axillary vein; area of distal portion of costal veins buffy in type, this only weakly indicated as a very narrow suffusion, proximad of the enlarged apices of the costal veins, in other specimens; radiate field in some lights distinctly iridescent, as in all other species of the Impar Group before us. Dorsal surface of abdomen ochraceous-buff, washed with cinnamon brown, this deepening to mummy brown distad. Cerci ochraceous-buff, bases and medio-distal joints washed with mummy brown. Ventral surface and limbs ochraceous-buff,[84] with a striking shining black maculation proximo-mesad on the abdomen.

Several specimens before us are of recessive coloration, in these the facial markings, normally decided in this species, are weakly defined or subobsolete. The delicate pronotal markings likewise show reduction in both extent and intensity in these examples.

In addition to the type and allotype, the following series is considered paratypic.

Porto Bello, Panama, II, 15, 1911, (Schwarz), 1 ♂.
Alhajuela, Pan., IV, 9 to 17, 1911, (Busck), 5 ♂.
Rio Trinidad, Pan., III, 19, 1912, (Busck), 1 ♂.
Rio Bejuco, Pan., (Schaus), 1 ♂.

[83] Several specimens before us have the head somewhat discolored in drying, the markings probably more suffused than in life, the small ocelli now not strikingly pale.

[84] The limbs are clearly discolored, ochraceous tawny, in the type.

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Neoblattella chagrensis[85] new species (Plate III, figure 14.)

This species belongs to the second division of the Impar Group, having, in the male, a simple type of subgenital plate, with simple cylindrical styles and lacking accessory specialized appendages. The concealed genitalia, however, show high specialization, and in several closely related tropical North American species before us,[86] aside from differences in size, pronotal proportions and development of tegmina and wings, the concealed genitalia alone afford conspicuous diagnostic characters in the very distinctive development found in each. The very remarkable fact is that, in all of these species, the male subgenital plate and styles are the same in form and proportions, whereas in all the other very numerous species of the genus before us, the male subgenital plate and styles, in every case, show remarkable and constant differential characters.

Only two species of the Impar Group, having the distal tegminal cross-veinlets strikingly darkened, have been described; one of these, *brunneriana* (Saussure),[87] from Mexico,[88] the other, *albida* (Saussure),[89] from Colombia. Unfortunately, though in general

[85] In reference to the type locality of the species, situated in the Chagres River drainage.

[86] These other species are, apparently, yet undescribed.

[87] **Neoblattella brunneriana** (Saussure)

1868. *Blatta brunneriana* Saussure, Rév. et Mag. de Zool., 2e sér., xx, p. 78. [♀; [Cordillera Oriental], Mexico.]

1870. *Blatta brunneriana* Saussure, Miss. Sci. Mex., Rech. Zool., Orth., p. 32, pl. i, fig. 20. (More complete discussion of type.)

Type, ex Saussure: length of body, [1] 2; length of body and tegmen, [1] 6; length of pronotum, 3; width of pronotum, 4 mm.

[88] We find that our diagnosis given for the previously undescribed male of *brunneriana* (Ent. News, xxvii, p. 159, footnote 3, (1916)), unfortunately does not apply to that species, but to a related, distinctive, undescribed species. The material then supposed to represent *brunneriana* (Ent. News, xxvii, p. 159, footnote 1) includes several undescribed species of the Impar Group.

[89] **Neoblattella albida** (Saussure)

1869. *Blatta albida* Saussure, Rév. et Mag. de Zool., 2e sér., xxi, p. 110. [♂; Bogotá, [Colombia].]

1870. *Blatta albida* Saussure, Miss. Sci. Mex., Rech. Zool., Orth., p. 37. (More complete discussion of type.)

Type, ex Saussure: length of body, 10.2; length of tegmen, 12.5; length of pronotum, 2.6; width of pronotum, 3.8 mm.

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fully described, the specific diagnostic features of greatest value can not be determined for *brunneriana* and in *albida* are inadequately treated.

The Mexican species is distinctly larger, with more elongate tegmina and wings, than the species here described. The Colombian species is apparently very close, though nothing of value is stated for the genitalia, and we feel justified in describing the Panamanian material as distinct, only because we have evidence that the Impar Group splits up into an exceptional number of species, each in distribution probably confined to a relatively very limited area.

Type.—♂; Gatun, Canal Zone, Panama. July 15 to 31, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 434.]

Size medium for the group, similar to that of *N. acanthastylata* here described and *N. albida;* form rather slender, as in those species. Interocular space relatively very narrow, distinctly less than half as wide as that between antennal sockets; ocellar spots small but distinct. Maxillary palpi and pronotum much as in *acanthastylata.* Tegmina delicate; with (six sinistral, eight dextral) longitudinal discoidal sectors; cross-veinlets heavy distad and in area of dextral tegmen concealed when at rest. Wings delicate; proximal (seven) costal veins briefly but heavily clubbed distad; ulnar vein with (three) complete branches; intercalated triangle small. Abdomen with dorsal surface unspecialized.

Supra-anal plate strongly transverse, weakly triangularly produced with apex broadly rounded. Concealed genitalia: from below base of sinistral cercus a moderately broad, flattened, cylindrical, chitinous process extends caudad, curving dorso-dextrad, with distal portion slightly widened, rounded in outline, but armed at apex with a spine curved strongly dextro-ventrad to its straight, aciculate apex and below this armed with a similar spine curved ventrad.

Subgenital plate weakly asymmetrical, due to a very slightly greater production of the plate toward the sinistral style; weakly convex proximad, deplanate mesodistad, with latero-distal portions moderately reflexed; lateral margins nearly straight, subsinuate to apices of latero-distal reflexed portions, there sharply convex-declivent in brief distance to medio-distal deplanate area, the distal margin of which is moderately convex; styles situated in the angles thus formed, simple, elongate, cylindrical, with apices rounded, each showing a feeble outward laterad curvature and about four times as long as wide, in length each equalling half the distance between their bases. Limbs and their armament, pulvilli and arolia, as given for *acanthastylata.* Tarsal claws specialized; internal flange well developed, with (four to six) relatively decided but minutely microscopic teeth distad, showing slightly greater specialization than in *acanthastylata.*

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Allotype.— ♀; same data as type, but taken July 28 to August 5, 1916. [Hebard Collection.]

Agrees with male except in the following features. Size somewhat larger. Interocular space about four-fifths as wide as that between antennal sockets. Tegmina and wings slightly more elongate.[90] Supra-anal plate moderately transverse, weakly triangularly produced, with apex strongly but irregularly concave emarginate. Subgenital plate scoop-shaped, with meso-distal portion narrow and strongly produced; lateral margins briefly straight to bases of cerci, there convex declivent, with margin of declivent portions somewhat thickened and armed with numerous, minute, stout, chitinous spines, biseriately arranged; from the distal extremities of these declivent portions, the lateral margins are straight and convergent to near the narrow apex, where they curve briefly and weakly ventrad to their juncture.

General coloration buffy, tinged with buckthorn brown. Head buffy, with two vertical lines on occiput, a broad band between eyes, a narrower band, convex ventrad, between ocelli and maculations on face of blackish brown;[91] ocelli small, pale buffy, striking.[92] Pronotum with disk pictured and dotted much as in *acanthastylata*, but these markings are more obscured, since, in the present material, the disk is much suffused with cinnamon brown; marginal portions hyaline, with a faint buffy tinge. Tegmina transparent, buckthorn brown, with cross-veinlets distad and in area of dextral tegmen, concealed when at rest, conspicuously darkened.[93] Wings hyaline, with a very faint brown tinge, veins buckthorn brown, with enlarged apices of costal veins cinnamon brown, while proximad of these a very faint and narrow buffy suffusion is appreciable. Dorsal surface of abdomen and cerci as in *N. impar*. Ventral surface buckthorn brown, limbs ochraceous-buff, with inconspicuous dots of dresden brown to prout's brown on tibiae and tarsi; ventral surface of abdomen with an irregular proximal suffusion of blackish brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *type*	10.3	2.7	3.7	11.7	3.4
Gatun, *paratype*	9.7	2.6	3.4	11.3	3
♀					
Porto Bello, *paratype*	12	3.1	4	11.7	3.7
Gatun, *allotype*	12.3	2.8	3.8	12.6	3.7

In addition to the type and allotype, the following paratypes are at hand.

[90] Tegmina with seven sinistral and six dextral discoidal sectors; wing with ulnar vein showing four branches.

[91] These markings are very weak and suffused in the male, clear cut and distinct in the female.

[92] The pale ocelli often become discolored and almost indiscernable in dried material. This is true of the female before us.

[93] This is more decided in the male before us, in which these veinlets are prout's brown.

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Porto Bello, Panama, IV, 21, 1912, (Busck), 1 ♀.
Gatun, Canal Zone, Pan., IV, 7, 1911, (Jennings), 1 ♂.

Neoblattella nahua (Saussure) (Plate III, figure 15.)

1868. *Blatta nahua* Saussure, Rév. et Mag. de Zool., 2e sér., xx, p. 355. [♂, ♀, Mexico.]

1893. *Blatta nahua* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 42, pl. iv, figs. 19, 20 and 21. [♂, ♀; Atoyac, Vera Cruz and Tabasco, Mexico.]

The present species bears a very close general resemblance to *N. adspersicollis* (Stål), genotype of *Neoblattella*, these being the largest known species of the genus. The unusual specialization of the dorsal surface of the male abdomen leads us to assign it to a different group, here designated as the Nahua Group, of which the smaller but similarly specialized and broad *N. fraterna* (Saussure and Zehntner) is the only other member known to us.[94]

This abdominal specialization may be described as follows.[95] Fifth dorsal abdominal segment with lateral portions produced, lateral surface concave with outer margin folded up and over the outer portion of the concave area, thus forming a partially inclosed pocket on each side; sixth segment with surface subchitinous mesocaudad, there, in a small area, with caudal margin concave, leaving exposed only a brief area of the similarly subchitinous and elsewhere concealed seventh segment; eighth segment with narrow distal portion alone visible, margin showing a small indentation opposite either cercal base, also weakly chitinous mesad; the brief median portion of this segment, minute exposed portion of seventh and all but the lateral margins of the sixth segments supplied with scattered hairs.

Porto Bello, Panama, II, 15 to III, 15, 1911, (Busck), 1 ♂, 1 juv. ♂, 1 juv. ♀.
Rio Boqueron, Pan., V, 1907, (Busck), 1 ♀.
Alhajuela, Pan., IV, 17, 1911, (Busck), 1 ♂, 1 juv. ♀.
Taboga Island, Pan., VI, 9, 1911, (Busck), 1 ♀.

The male from Alhajuela is unusually small: length of body, 15.5; length of pronotum, 3.8; width of pronotum, 5; length of tegmen, 16.8; width of tegmen, 5 mm. A considerable series of the species from tropical North America at hand is decidedly con-

[94] In *adspersicollis* the dorsal surface of the male abdomen is unspecialized; that species is found in tropical South America, while *nahua* ranges from tropical Mexico to Panama.

[95] Saussure and Zehntner's figure, in the Biologia, Orthoptera i, pl. iv, fig. 19, shows this feature, but only in a superficial manner.

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stant in size and development of the organs of flight. The specimen from Taboga Island, however, though of the usual large size shows moderate tegminal and wing reduction (length of tegmen, 16; width of tegmen, 5.4 mm.).

Neoblattella fraterna (Saussure and Zehntner) (Plate III, figure 16.)

1893. *Blatta fraterna* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 44. [♂; Chontales, Nicaragua.]

Gatun, Canal Zone, Panama, IV, 7, 1911, (Jennings), 1 ♂, 1 juv. ♀; VII, 17 to VIII, 22, 1916, (Harrower), 3 ♂, 2 juv. ♂, 3 juv. ♀, 3 small juv.
Rio Boqueron, Pan., V, 1907, (Busck), 3 ♀.
Tabernilla, C. Z., Pan., VI, 16 and 25, 1907, (Busck), 1 ♂, 1 ♀.
Cabima, Pan., V, 17 to 20, 1911, (Busck), 3 ♀.
Calidoma Road, Pan., IV, 12, 1911, (Jennings), 2 juv.

The present species is a member of the Nahua Group. The young of this insect, which in the adult condition is plainly colored, are strikingly and distinctively marked. The pronotum, mesonotum and metanotum are buffy, with two narrow adjacent medio-longitudinal lines of dark brown, and on each side the broad translucent margins are bordered internally by bands of dark brown, which are slightly narrower than the marginal portions, the intervening buffy bands thus formed showing scattered dark brown dots. The dorsal surface of the abdomen is blackish brown, punctate to varying degrees with buffy.

LOPHOMETOPUM[96] new genus

The present genus shows unquestionable affinity to *Neoblattella* Shelford in form and general structure, and particularly in the differentiated pulvilli and specialized tarsal claws. Nearest affinity to the Carrikeri Group of that genus is shown.

From *Neoblattella* it is possible to separate *Lophometopum* by the distinct interocular ridge and the "type B" armament of the ventro-cephalic margins of the cephalic femora. The coloration of the tegmina and wings in the only known species of the genus is of a type previously unknown to us.

In linear arrangement this genus follows *Neoblattella* and precedes *Blattella* Caudell; the latter genus is of Old World origin and distantly related.

[96] From λόφος = ridge, and μέτωπον = forehead. In allusion to the striking transverse ridge between the eyes.

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The genus is monotypic. GENOTYPE: *Lophometopum leptum* new species.

Generic Description.—Size medium, form slender, structure extremely delicate for the Group Blattellites. Interocular space narrow, formed by a low but striking transverse rounded ridge; the vertex and inter-ocular-ocellar areas in very different planes, the latter small, feebly concave, rounding broadly laterad; ocellar spots obsolete (possibly distinguishable in fresh material); face broad and moderately convex with lateral margins parallel to clypeal suture. Eyes prominent dorso-laterad, not extending ventrad below the antennal bases. Maxillary palpi very elongate; distal joint short, much shorter than the preceding joints.

Pronotum transverse; disk feebly convex, showing transverse impressions cephalad and latero-caudad; lateral margins broad and scarcely declivent. Tegmina and wings fully developed. Tegmina with discoidal sectors longitudinal. Wings with costal veins weakly clubbed, ulnar vein with complete branches, intercalated triangle small but distinct. Dorsal surface of male abdomen unspecialized, subgenital plate symmetrical.

Limbs extremely long and slender for the Group Blattellites. Ventro-cephalic margin of cephalic femora armed with (three to five) elongate (relatively slender for the Group) spines, which are elongate proximad but rapidly decrease in length distad, succeeded by a row of well-spaced minute chaetiform spines,[97] terminating distad in two elongate spines, the more distal the longer. Ventro-caudal margin of cephalic femora armed with (three and one distal) elongate and moderately heavy spines; other ventral femoral margins well supplied with elongate and moderately heavy spines. Ventral surfaces of four proximal tarsal joints supplied distad with small pulvilli, the apices of which are produced, filiform, as in *Neoblattella*. Tarsal claws with a heavy internal flange, its margin serrate. Delicate arolia present.

Lophometopum leptum new species (Plate IV, figures 1 to 6.)

This is a really beautiful insect, due to the high polish of its dorsal surface, its delicate structure and pale brown coloration with

[97] It is clear that, though this armament is "type B", the decided and rapid reduction in length of the proximal heavy spines and the unusually wide spacing of the more distal chaetiform spines show some convergence toward "type A."

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a broad band of darker brown crossing the tegmina, when at rest, in their meso-distal portion. We know of no other species of similar coloration.

Type.—♂; Gatun, Canal Zone, Panama. (A. H. Jennings.) [United States National Museum.]

Supplementing the generic features here given, we would note the following for this species. Interocular space approximately two-fifths as wide as that between the antennal sockets. Maxillary palpi with third and fourth joints subequal in length, each about twice as long as interocular width, fifth joint small, enlarged, slightly over half as long as fourth joint.

Pronotum broad oval, with cephalic margin moderately flattened and caudal margin broadly flattened, showing a very feeble convexity. Tegmina very elongate, the median third with margins parallel. the sutural margin showing the greater convergence distad, the rather sharply rounded apex slightly nearer the costal margin; discoidal sectors (seven) regular. Wings moderately broad; the moderately elongate costal veins with distal half moderately enlarged, the clubs (seven) resultantly very elongate; ulnar vein with (four) complete branches, these and the discoidal and median veins connected by weak transverse veinlets; intercalated triangle over half as broad as long.

Supra-anal plate with length approximately two-fifths proximal width, triangularly produced, rectangulate emarginate distad, the apices thus formed broadly rounded and supplied with a few long hairs, as is the distal portion of the abdomen and the cerci. Cerci with (eleven) distinct joints, each with lateral margins convex, this convexity sharp proximad and distad beyond the proximal segments except in the apical segment which is slender and cylindrical; dorsal surface of cercus feebly convex, ventral surface with segments moderately convex and strongly cingulate laterad.

Concealed genitalia: the paired plate beneath the supra-anal plate is reduced, very delicate, the caudal face of each half convex; the remaining organs within the anal chamber are withdrawn and can not be seen in the type.

Subgenital plate scoop-shaped, symmetrical; lateral portions vertical, margins straight, parallel, weakly declivent, distad rounding broadly ventrad into distal two-thirds of free margin which is transverse, with a small rounded ridge on each side dorsad, each occupying one-third of this section of the free margin; from sockets at the angles formed by the lateral and mesal portions of the plate spring the similar, heavy, cylindrical styles, directed dorsad and feebly caudad, three times as long as wide, their apices subchitinous dorso-caudad, each supplied dorso-cephalad with two minute uncinate teeth which curve over the soft areas.

Head shining, ochraceous-buff; eyes and a broad interocular band blackish brown. Limbs and spines immaculate ochraceous-buff. Ventral surface of abdomen shining blackish brown, except narrowly proximo-laterad where it is ochraceous-buff. Pronotum shining; disk ochraceous-tawny with three very inconspicuous pairs of darker flecks, lateral margins transparent faintly tinged with brown. Tegmina transparent, faintly tinged with brown except in penultimate fifth, where the areas

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exposed when at rest are translucent prout's brown in a broad transverse band, beyond this the tips are transparent, very faintly tinged with brown; portion of dextral tegmen concealed when at rest, faintly tinged with brown, the transverse dark band there fading out rapidly. Wings transparent, faintly tinged with brown, except in area of enlarged portions of costal veins which is prout's brown, this area, when tegmina and wings are at rest, lying beneath the dark transverse tegminal band. Dorsal surface of abdomen buffy, supra-anal plate with all borders washed with prout's brown. Cerci buffy, except first and last joints, which are prout's brown.

Length of body, 9.5; length of pronotum, 2.8; width of pronotum, 3.8; length of tegmen, 12.1; width of tegmen, 3.75; length of caudal femur, 4.45; length of caudal tibia, 5.7; length of caudal tarsal joints, 3.3; length of cercus, 3.1 mm.

In the immature condition the coloration is very similar, except that the dorsal surface of the abdomen is prout's brown laterad in the distal half, this increasing to the supra-anal plate and cerci which are entirely of that color.

In addition to the type we have two immature examples, taken by A. H. Jennings on the upper Rio Pequeni, Chagres Basin, Panama.

Blattella germanica (Linnaeus) (Plate V, figure 16.)

1767. [*Blatta*] *germanica* Linnaeus, Syst. Nat., ed. XII, p. 668. [Denmark.]

Gatun, Canal Zone, Panama, VIII, 6 to 22, 1916, (Harrower), 1 ♀; (Jennings), 1 ♂.

Tabernilla, C. Z., Pan., V, 9, 1907, (Busck), 1 ♀.

Ancon, C. Z., Pan., I, 12, 1911, (Busck), 1 ♀; (Jennings), 1 ♀.

Ischnoptera nox new species (Plate IV, figure 7.)

The present species shows a somewhat intermediate condition between the known forms of the Morio and Rufa Groups. The black coloration suggests the known species of the former, while the subchitinous area of the male supra-anal plate is more extensive than in any of the known species of the Rufa Group, though by no means as large or as highly developed as in the known species of the Morio Group.

From the sum of the characters observed we place *nox* in the Rufa Group, after *vulpina* Hebard and before *rufa rufa* (De Geer). The tegmina and wings are somewhat more elongate than in *rufa rufa*, much as are frequently found in *rufa occidentalis* Saussure, but proportionately not as elongate as in *vulpina*. The distinctive male supra-anal plate is clearly a further development of the type found in *rufa rufa*, the subgenital plate in this sex closely resembles

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the type found in *rufa debilis* Hebard.[98] Females are distinguished by their general black coloration and decidedly smaller size than those of the known species of the Morio Group.

Type.— ♂; Porto Bello, Panama. April 20, 1912. (A. Busck.) [United States National Museum.]

Size medium large; form moderately stout, slightly more slender than is normal in *rufa rufa*. Interocular space rather narrow, about two-thirds as wide as that between the ocelli, about one-third as wide as that between the antennal sockets. Ocelli large and distinct, flattened surfaces of ocellar areas forming a rather sharp angle with inter-ocular-ocellar area, in this respect agreeing more closely with *I. morio* Burmeister. Maxillary palpi rather short; fourth joint slightly shorter than third and but two-thirds as long as fifth (distal) joint, much as in *morio*. Latero-caudal sulci of pronotal disk distinct. Tegmina and wings fully developed, much as in *rufa rufa*, tegmina more slender, portion of dextral tegmen concealed when at rest, not strikingly transparent. Wings suffused, with veins dark. Dorsal surface of abdomen specialized as is characteristic for the genus.[99]

Supra-anal plate produced, with lateral margins moderately convergent to median portion (over one-third of whole) where the greatest production occurs, this portion not as broad as in *rufa rufa*, the margin there being convex and supplied with long hairs, the entire surface subchitinous to and including the caudal margin, thus forming a broad transverse oval.

Concealed genitalia: titillator alone visible; elongate, with dextral margin straight, sinistral margin convex, widening from narrow proximal portion and then tapering to the straight acute apex, entire surface thickly covered with minute short teeth directed distad.

Subgenital plate strongly asymmetrical, surface convex except at produced portion where it is moderately concave; produced portion semicircular; sinistral style situated at sinistral base of produced portion, unspecialized, straight, elongate, conical, about three times as long as width at its slightly enlarged base; dextral style situated slightly sinistrad of mesal point on margin of produced portion, directed rather strongly sinistrad in thick basal portion, mesad bent more strongly sinistrad with distal portion conical and armed with a number of straight spiniform teeth.

Allotype.— ♀; Tabernilla, Canal Zone, Panama. (A. Busck.) [United States National Museum.]

Agrees with male in ambisexual characters, differing in the following features. Size slightly larger, form appreciably broader with pronotum more ample. Interocular space very slightly wider than that between the ocelli. Ocellar areas not fully as sharply defined. Tegmina and wings proportionately fully as elongate as in the male, well surpassing the cercal extremities. Supra-anal plate with margin very feebly concave at cercal bases, between these triangularly produced with apex

[98] Figured, Trans. Am. Ent. Soc., xlii, pl. xvi, fig. 6, (1916).

[99] See Hebard, Mem. Am. Ent. Soc., 2, p. 62, (1917).

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bluntly rounded,[100] briefly subchitinous meso-distad, length nearly half proximal width. Subgenital plate convex, very broad, with free margin evenly and very broadly convex, truncate mesad.

Head blackish brown, ocelli and mouth-parts buffy, maxillary palpi with distal joint darkened. Limbs buffy. Ventral surface of abdomen blackish brown. Pronotum blackish brown. Tegmina translucent, dark chestnut brown, becoming slightly paler distad; portion of dextral tegmen concealed when at rest, transparent and slightly paler. Wings transparent, with a faint tinge of brown, the entire area of the costal veins chestnut brown, other principal veins and connecting veinlets chestnut brown. Dorsal surface of abdomen chestnut brown, paler proximad. Cerci dark chestnut brown.

A paratypic female differs in having the mouth-parts all darker, the limbs dark chestnut brown.

Measurements (in millimeters)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tarsal joints
♂, Porto Bello, *type*...	14	3.4	4.5	15	3.9	4.3
♀, Tabernilla, *allotype*.	17.2	4.6	5.7	17	4.7	5.3
♀, Chorrera, *paratype*.	16.7	4.8	5.8	17.3	4.9	4.7

In addition to the type and allotype, a paratypic female is at hand, taken at Chorrera, Panama, on May 17, 1912, by A. Busck.

Ischnoptera rufa rufa (DeGeer) (Plate IV, figure 8.)

1773. *Blatta rufa* DeGeer, Mem. l'Hist. Ins., iii, p. 539, pl. 44, fig. 7. [Surinam.]
1916. *Ischnoptera rufa rufa* Hebard, Trans. Am. Ent. Soc., xlii, p. 346, pl. xvi, figs. 3 and 4. [Detailed discussion.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1916, (Harrower), 1 ♂, 3 ♀.
Lion Hill, C. Z., Pan., VII, 28, 1907, (Busck), 1 ♂.
Alhajuela, C. Z., Pan., III, 4, 1912, (Busck), 1 ♀.
Tabernilla, C. Z., Pan., VI, 20 to VII, 31, 1907, (Busck), 2 ♂, 1 ♀.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under débris on edge of jungle), 1 juv. ♂.
Zone limit five miles west of Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂.
Paraiso, C. Z., Pan., IV, 24, 1911, (Busck), 1 ♀.
Corozal, C. Z., Pan., IV, 26 and 27, 1911, (Busck), 3 ♂.

[100] A paratypic female at hand has the supra-anal plate with apex truncate. Such variation in the female supra-anal plate appears to be general in the group and led Saussure and Zehntner to describe *conformis*, a synonym of *rufa occidentalis* Saussure, based on this feature of difference. This is well shown in figures 24 and 25 of plate iii, Biol. Cent.-Am., Orth., i, both of which represent examples of *rufa occidentalis* Saussure. We unfortunately synonymized *conformis* under *rufa rufa* instead of under *rufa occidentalis* and take the present opportunity to correct this error made in 1916, Trans. Am. Ent. Soc., xlii, p. 346.

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Ancon, C. Z., Pan., (Jennings), 1 ♂.
Panama, Pan., 1913, (Zetek), 1 ♂, [United States National Museum].

The present series shows little variation, as is characteristic of the present race. This is in strong contrast with the exceptional amount of individual variation usually found in *rufa occidentalis* Saussure.

Ischnoptera rufa occidentalis Saussure (Plate IV, figures 9 and 10.)

1862. *I[schnoptera] occidentalis* Saussure, Rév. et Mag. de Zool., (2), xiv, p. 170. [♀; New [Orleans, Louisiana].]

1893. *Ischnoptera conformis* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 37, pl. iii, fig. 25. [♀, Nicaragua.]

Tabernilla, Canal Zone, Panama, (Busck), 1 ♂.
Cabima, Pan., V, 19, 1911, (Busck), 1 ♀.
Chorrera, Pan., V, 14, 1912, (Busck), 1 ♀.

These specimens show not only the highest development in the present race as to size, but also in intensification of coloration and in the diagnostic features of the male genitalia. It is therefore evident that we have in Panama no intergradation between *rufa rufa* and *rufa occidentalis*, but instead the most divergent type developed in the latter plastic race, contrasting strongly with the constant *rufa rufa*.

The distribution of *rufa occidentalis* is now known to extend in continental North America from the subtropical regions of the Gulf of Mexico southward to Panama; that of *rufa rufa* from the northeastern portion of South America westward to Panama and northward throughout the West Indies. It is possible that *rufa* originally passed from the West Indies to continental North America, and that the area where intergradation between *rufa rufa* and *rufa occidentalis* would occur no longer exists. If so, we would find in Panama the western limit of the distribution of typical *rufa* and the most southern point reached by *rufa occidentalis*. In this way alone do we feel able to account for the signal differentiation between these two races in the same region. The convergence in the large series of *rufa occidentalis* before us toward typical *rufa* shows definitely that these two types represent races, and nothing more, of one and the same species.

The material here studied of *rufa occidentalis* is in every way similar to specimens from Pózo Azúl, a locality in the southwestern

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lowlands of Costa Rica, about ten miles up the Rio Pirrís.[101] This optimum type probably represents an incipient geographic race, but as yet has not reached a sufficient degree of differentiation to warrant nominal recognition.

That the present insect, though not domiciliary, thrives about human habitations under litter of all kinds, must be considered in studying material. It is this factor which increases the possibility of specimens being found adventive and not peculiar to the locality at which they were secured.

The concealed male genitalia in this species are very complex. The genital hook is simple, the titillator specialized distad (plate IV, fig. 9), this specialization more decided in *rufa debilis* Hebard and *rufa occidentalis* than in *rufa rufa*. The paired plate beneath the supra-anal plate is highly specialized on both sides, developed into chitinous lobes and shafts, of which the sinistro-dorsal shows the greatest specialization. The usual development of this shaft is here shown (plate IV, fig. 10). Individual variation occurs in which one or both of the marginal teeth disappear, and in *rufa occidentalis* the shaft occasionally is much broader, or much more elongate and slender. In *rufa occidentalis* the ventral surface of the supra-anal plate frequently bears a large, irregularly rounded, mesal lobe covered with stiff bristles, or is unspecialized as is normal in *rufa rufa*. These features of variability in the male concealed genitalia are a very unusual occurrence in the Blattidae.

Ischnoptera gatunae[102] new species (Plate IV, figure 11.)

The present species belongs to a group of elongate, light brown forms, having the latero-caudal sulci of the pronotal disk well developed and in some of the species distinctively colored. This group we would call the Gatunae Group; it apparently follows the Rufa Group and precedes the Apolinari Group in linear position, the latter coming before the second section of the genus, which includes a number of groups of relatively much smaller species.

[101] For a discussion of this material and the variability of this race, see Hebard, Trans. Am. Ent. Soc., xlii, p. 354, (1916).

[102] The material of this species was taken on the Rio Trinidad, in an area now flooded by Gatun Lake.

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When compared with a female of *I. bergrothi* (Griffini),[103] females of this species are found to differ in the narrower interocular space (.5 instead of .7 millimeter in width) and pronotum with disk largely suffused, latero-caudal sulci not distinctively colored and caudal marginal portion transparent. We feel satisfied that when the male sex of *bergrothi* is found, further distinctive features in the genitalia will be noted.

Type.— ♂; Rio Trinidad, Panama. March 7, 1912. (A. Busck.) [United States National Museum.]

Size medium large, form slender. Interocular space narrow (.3 millimeter), about one-third as wide as that between antennal sockets, four-fifths as wide as interocellar space. Ocelli large and distinct, flattened surfaces of ocellar areas forming a moderately sharp angle with interocellar area. Maxillary palpi moderately short; fifth (distal) joint very slightly longer than third. Latero-caudal sulci of pronotal disk pronounced. Tegmina and wings extending beyond apex of abdomen nearly twice the cercal length. Tegmina elongate and narrow, with portion of dextral tegmen, concealed when at rest, transparent though slightly suffused. Dorsal surface of abdomen specialized as is characteristic of the genus.[104]

Supra-anal plate trapeziform produced, with latero-caudal angles rounded and margin between transverse; feebly and irregularly subchitinous in a small median area, just dextrad of which the ventral surface of the plate is produced ventrad in a thick heavy plate with apex rounded.

Paired plate beneath supra-anal plate specialized on each side, the dorsal chitinous arms, of which the dextral is much the longer, each armed with a distal spine; beneath the sinistral of these is a heavy lobiform plate which is heavily spined dorsad, while dextrad is a large chitinous lobe covered with elongate hairs. Titillator very similar to that of *I. rufa occidentalis* Saussure (plate IV, fig. 9).

Subgenital plate hairy, strongly asymmetrical, surface convex except in produced portion, where it is moderately concave; dextral portion of free margin strongly convex to brief median portion of plate, which is weakly triangularly produced; the dextral style at the apex, about twice as long as basal width, tapering slightly to its rounded apex, which is covered dorsad with minute teeth, this style directed sinistrocaudad, so that its dextral margin is an almost even continuation of the dextral margin of the produced portion of the plate; sinistral margin feebly convex, then feebly concave to median produced portion, at the base of which is situated the very small sinistral style, suboval, straight, supplied in distal half of sinistral face with minute teeth, about three-quarters as long as dextral style and situated at a distance from it of slightly less than its own length.

[103] We have two Costa Rican females, apparently of that species, described from a single female from Punta de Sabana, Darien, (Panama).

[104] Described; Mem. Am. Ent. Soc., 2, p. 62, (1917).

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Limbs and armament of same as characteristic for the genus. First four caudal tarsal joints supplied distad with moderately well developed simple pulvilli. Small arolia present.

Allotype.— ♀; same data as type, but taken March 23, 1912. [United States National Museum.]

This sex differs from the male in the following characters. Size slightly larger, form broader but still very slender for the genus. Interocular width (.5 millimeter) slightly less than that between the ocelli, slightly more than half the width between the antennal sockets. Ocellar areas as sharply defined but angle with interocellar area not as sharp. Tegmina and wings proportionately fully as elongate as in male. Supra-anal plate one-half as long as basal width; lateral margins straight and moderately convergent to mesal third between cerci, there the plate is produced with margins feebly convex convergent to the blunt apex. Subgenital plate moderately convex, very broad, with free margin evenly and broadly convex.

Head dark chestnut brown; ocelli light buff. Antennae mummy brown, except first joint which is ochraceous-buff. Mouthparts, maxillary palpi, limbs and ventral surface of abdomen ochraceous-buff, the latter strongly tinged with cinnamon brown. Pronotum with disk heavily suffused with cinnamon brown in a vague pattern; lateral portions ochraceous-buff, this narrowly invading the disk cephalad of the latero-caudal sulci; caudal portions transparent. Tegmina translucent, dresden brown, the marginal field paler. Wings transparent, area between costal veins dark chestnut brown, shading to cinnamon brown toward the free margin and in the entire distal portion beyond the humeral vein; colorless between the dark chestnut brown principal veins; radiate field slightly tinged with brown. Dorsal surface of abdomen buckthorn brown, suffused laterad with prout's brown. Cerci prout's brown.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Rio Trinidad, *type*.....	16	3.6	4.8	16.2	4.4
Rio Trinidad, *paratype*..	13.5	3.3	4.7	15	4.2
♀					
Rio Trinidad, *allotype*...	15.5	4	5.5	16.7	4.6
Rio Trinidad, *paratype*..	14.5	3.9	4.9	15.7	4.4
Rio Trinidad, *paratype*..	14.6	4	4.9	16.8	4.7

In addition to the type and allotype, one male and two female paratypes are at hand, bearing the same data but taken March 28 to May 9, 1911 and 1912.

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Ischnoptera inca Saussure and Zehntner (Plate IV, figure 12.)

1893. *Ischnoptera inca* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 38, pl. iv, fig. 23. [Senahu, Vera Paz, Guatemala.]

It is to be noted that material from Peru is included with the original description, described as a variety. We here select Senahu, Guatemala, as the type locality for *inca*. Consequently, should Peruvian material prove to be a distinct species, as is very probable, it will require a different name.

Rio Trinidad, Panama, VI, 4, 1912, (Busck), 1 ♀.
Cabima, Pan., V, 29 and 30, 1911, (Busck), 2 ♂.

It is much to be regretted that the male genitalia were virtually undescribed, a brief and unsatisfactory description of the supra-anal plate alone having been given.

The size is either somewhat variable in this insect, or more than one species of this type, with solidly black pronotum and antennae yellowish beyond the proximal portion, is represented in material before us. The material here recorded shows in tegminal length: ♂, 8.7 to 8.9; ♀, 8.3 millimeters. A female from Costa Rica shows for this dimension, 10.8; one from Nicaragua, 9.3 millimeters.

Ischnoptera mirella new species (Plate IV, figure 13.)

In the solidly dark pronotum and antennae this diminutive insect agrees with *I. crispula* Rehn and *I. castanea* Saussure (the male type of the former from Pará, Brazil, and a male of the latter species from Igarapé-assú, Pará, Brazil, are before us), while in size and general coloration further agreement with the latter species is found.

The male genitalia of the present species are, however, of a remarkable type showing no affinity to any of the previously described species of the genus.

Type.—♂; Porto Bello, Panama. April 17, 1912. (A. Busck.) [United States National Museum.]

Size small, form moderately slender as in *castanea*. Interocular space broad, intermediate between the width between the ocelli and that between the antennal sockets. Ocelli large and distinct, flattened surface of ocellar areas forming a moderately sharp angle with the interocellar area. Maxillary palpi short; fifth (distal) joint slightly longer than third, which joint is slightly longer than the fourth.

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Pronotal disk with latero-caudal sulci very pronounced, as in *I. inca* Saussure and Zehntner. Tegmina and wings extending beyond apex of abdomen nearly twice the cercal length. Wings with well developed intercalated triangle. Dorsal surface of abdomen specialized, as is characteristic of males of the genus, with the exception that the raised portion of the seventh abdominal segment is unusually large, horse-shoe shaped, with dorsal surface deplanate and subchitinous.

Supra-anal plate very highly specialized; strongly produced, straight, directed caudad with a moderate inclination sinistrad, extending to distal portion of sinistral cercus, the produced portion about twice as long as broad, curled over longitudinally sinistrad so that the sinistral portion of the free margin is ventrad, the dorsal surface there longitudinally convex, bordered dextrad by a shallowly concave channel, beyond this deflexed so that the dextral portion of the free margin is ventrad in the produced portion of the plate; sinistral margin straight, curving upward distad to the brief transverse distal margin, supplied with a heavy fringe of agglutinated chaetiform spines which distad project beyond the distal margin; distal margin straight, subchitinous, moderately oblique, the greater production of the plate being sinistrad; dextral margin showing a strong subcircular emargination sinistrad of cercal base, thence nearly straight along produced portion of plate, showing a moderate oblique inclination sinistrad in proximal half, this weaker in distal half, the dextro-caudal angle rounded and supplied with moderately numerous hairs. From the shape of the produced portion of the supra-anal plate nearly a third of the dextral portion of the anal chamber is exposed from above. Cerci with (eleven) distinct joints, feebly convex dorsad, strongly so ventrad with cingulation of lateral margins very weak, subobsolete as is usual in the small species of the genus.

Concealed genitalia: without dissection we can only observe that the paired plate beneath the supra-anal plate is flattened into a chitinous wall cephalad, from which projects at the base of the dextral cercus a minute upcurved process with apex aciculate, beneath which is a short heavier projection armed along its dextral margin distad with four minute but heavy and regular teeth.

Subgenital plate subtriangular; sinistral margin feebly convex to apex, showing a small concavity slightly beyond the mesal point, from a socket there situated springs a very minute simple style feebly tapering to its unarmed rounded apex, slightly over twice as long as basal width, dextral margin slightly more strongly convex, apex surmounted by a highly specialized (the dextral) style, which latter from a slender base projects caudad to a rounded apex, its entire sinistral surface produced in a feebly tapering cylindrical arm which curves sinistro-proximad and fits within the distal portion of the production of the supra-anal plate, the distal portion of this arm supplied with minute scattered teeth (see plate IV, fig. 13). Armament of limbs as characteristic for the genus. Four proximal caudal tarsal joints supplied ventro-distad with moderately well developed pulvilli. Arolia very small.

Head shining, very dark chestnut brown, ocelli, mouthparts and proximal joints of maxillary palpi buffy, the two distal joints of the maxillary palpi heavily washed with chestnut brown. Antennae dark chestnut brown. Pronotum shining, uniform dark chestnut brown. Tegmina translucent, heavily suffused with chestnut brown except in portion of costal field toward costal margin which is paler, buffy.

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Wings with costal field and all veins rather dark chestnut brown, all remaining portions of wing except proximal two-thirds of anterior field strongly tinged with chestnut brown. Dorsal surface of abdomen shining, rather dark chestnut brown. Cerci chestnut brown. Ventral surface of abdomen chestnut brown, slightly paler meso-proximad. Limbs buffy, except proximal portions of coxae which are suffused with chestnut brown, spines tawny.

Length of body, 10.2; length of pronotum, 2.8; width of pronotum, 3.3; length of tegmen, 11; width of tegmen, 2.9; length of cercus, 2; length of caudal femur, 4; length of caudal metatarsus, 2; length of succeeding caudal tarsal joints, 1.9 millimeters.

The type of this remarkable species is unique.

Ischnoptera panamae new species (Plate IV, figures 14 and 15.)

This species in general appearance resembles *I. tolteca* Saussure.[105] The description of *I. nana* Saussure and Zehntner would indicate nearest relationship to that species, but so insufficient is it that nothing definite as to the real degree of affinity can be ascertained. From that description, it appears that the present insect differs from *nana* in having the latero-caudal sulci of the pronotal disk distinct, not obsolete, while the styles of the male subgenital plate can hardly be termed normal.[106] In every case where males have been available for comparison, the genitalia for each species of the second section of the genus *Ischnoptera* have been found not only highly specialized but very distinctive.

Type.—♂; Empire, Canal Zone, Panama. November 14, 1913. (M. Hebard.) [Hebard Collection, Type no. 488.]

Size small, form moderately slender, much as in *I. mirella* here described. Interocular space moderately broad, slightly narrower than that between the ocelli, hardly three-fifths that between the antennal sockets. Ocelli large and distinct, flattened surface of ocellar areas forming a blunter angle with the interocellar area than in *mirella*. Maxillary palpi short, fifth (distal) and third joints subequal in length, distinctly longer than fourth. Latero-caudal sulci of pronotal disk moderately decided.[107] Tegmina and wings extending a short distance beyond apices of

[105] The unstudied collections at hand contain a number of species which, though in general appearance closely resembling *tolteca*, show remarkable male genitalic features of specific diagnostic value.

[106] From the measurements given for *nana*, the present species differs in the shorter pronotum and the more elongate tegmina. We regret that we do not, however, feel the confidence in the accuracy of the measurements given in this portion of the Biologia Centrali-Americana, probably taken by Zehntner, necessary to make them of any great value for close comparisons.

[107] In some individuals of the series more strongly indicated than in others.

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the cerci. Wings with a moderately well developed intercalated triangle. Dorsal surface of abdomen specialized as is characteristic of the genus; eighth segment with caudal margin rather strongly concave.

Supra-anal plate symmetrical, slightly over half as long as basal width; trapeziform produced between the cerci, with latero-caudal angles rounded and distal portion curled briefly ventrad, this decurved surface hairy, the transverse distal margin very feebly obtuse-angulate emarginate with apex of emargination rounded, this margin with ventral surface supplied with a narrow fringe of chaetiform spines directed cephalad. Cerci with joints (ten to twelve in the series) as in *mirella*.

Concealed genitalia: paired plate beneath supra-anal plate developed into two large disks, forming the basal wall of the anal chamber, the dextral overlapping the sinistral, the distal margins of these plates supplied with short heavy teeth (plate IV, fig. 15): titillator with apex simple and aciculate.

Subgenital plate with surface weakly convex, supplied with scattered hairs; sinistrad produced for a brief distance and curled under the cercus, the free margin of this portion fringed with chaetiform spines; dextrad produced about twice the length of the sinistral production and similarly curled under the cercus, the distal extremity of the dextral free margin bearing within a conical process much heavier than, and as long as, the largest style, its blunt apex supplied with a tuft of elongate agglutinated chaetiform spines, this directed sinistrad and entirely within the anal chamber; beyond these lateral portions the distal margin is transverse and weakly concave on each side, the remaining median third briefly produced, trapezoidal, the dextral production slightly the greater; sinistral style at sinistro-distal angle of this production, small, rather slender, cylindrical, over four times as long as proximal width, with apex bearing a few minute teeth; dextral style at dextro-distal angle of this production, similar to sinistral style but about three-quarters as large, extending a very slight distance further caudad, due to the general greater production of the plate in the dextral portion.

Armament of limbs as characteristic for the genus. Four proximal caudal tarsal joints supplied ventro-distad with small pulvilli. Arolia small.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

This sex differs from the male in the following features. Size distinctly larger,[108] form more robust. Interocular space broader, but, due to the broader head, showing the same proportionate width to that between the ocelli and that between the antennal sockets. Ocelli not as large and angle with interocellar area not as sharp. Tegmina and wings proportionately fully as elongate as in male. Supra-anal plate triangularly produced with lateral margins feebly convex and apex showing indication of emargination.[109] Subgenital plate moderately convex except toward

[108] The decided variation in size and coloration of the four females at hand would cause uncertainty, as to whether more than one species is represented, were it not for the fact that they agree closely in general structure, differing only in features which can not be considered of specific diagnostic value, while the fourteen males before us are readily recognizable as belonging to but one species.

[109] In the series varying from a type in which the apex is rounded, to one in which it is distinctly emarginate, forming two well-rounded projections.

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cercal bases where feeble concavity is indicated, very broad, with free margin evenly and broadly convex.

Head blackish chestnut brown, ocelli, mouthparts and maxillary palpi buffy. Antennae mummy brown. Pronotum shining, chestnut brown, narrowly margined laterad, except more broadly in area just caudad of discal sulci, and very narrowly margined cephalad with warm buff, the disk with a medio-longitudinal streak of tawny, which is broadest before the caudal margin. Tegmina translucent, light chestnut brown, with costal field dark in internal half, chestnut brown and in half toward costal margin warm buff. Wings very weakly suffused with brown, area of costal veins darker. Dorsal surface of abdomen buffy suffused with prout's brown, darkened distad. Cerci chestnut brown. Proximal portion of coxae blackish chestnut brown, the remaining portions of the limbs buffy with spines tawny. Ventral surface of abdomen blackish brown, except mesad and narrowly along the caudal margins of the segments, where it is buffy.

The series of males approximate this, the type, in coloration. In the maximum recessive condition the dark portions of the pronotal disk are much reduced, russet, the pale median line more extensive and continued out each of the latero-caudal sulci to the pale lateral margin, thus dividing the dark suffusion of the pronotal disk into four parts.

The females are all more intensive in coloration than the males. The allotype has the entire pronotum blackish chestnut brown, except the narrow pale margin and a narrow suffused medio-longitudinal line of hazel. Those from Old Panama and Panama City show only a feeble trace of the medio-longitudinal line of paler coloration, while the specimen from Chorrera has the pronotal disk solidly blackish chestnut brown. In the two darkest examples the distal portion of the fourth and all of the fifth joints of the maxillary palpi are heavily suffused with blackish chestnut brown.

A large immature female is entirely blackish brown, except for a paler longitutinal suffusion mesad on the mesonotum and metanotum of russet, and the cephalo-lateral margins of the pronotum and lateral margins of the mesonotum and metanotum which are ochraceous-buff.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *paratype*	8	2.2	2.9	9	2.8
Rio Trinidad, *paratypes* (7)	8.2–9.8	2.3–2.6	3–3.2	9.7–10	2.9–3
Empire, *type*	9.4	2.7	3.2	9.8	3
Old Panama, *paratypes* (2)	8.4–9.8	2.2–2.3	3–3.2	9–9.8	2.9–3
♀					
Empire, *allotype*	10.7	2.9	3.7	10	3.1
Old Panama, *paratype*	11.9	2.9	3.8	11	3.6
Panama City, *paratype*	9	2.7	3.3	9.2	2.9
Chorrera, *paratype*	12	2.9	3.9	12	3.7

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In addition to the type and allotype the following series of paratypes is before us.

Gatun, Canal Zone, Panama, VII, 12 to 15, 1916, (Harrower), 1 ♂.
Rio Trinidad, Pan., III, 7 to VI, 4, 1911 and 1912, (Busck), 7 ♂.
Empire, C. Z., Pan., XI, 14, 1913, (Hebard; under rubbish on edge of jungle), 1 ♂, 1 juv. ♀ in instar preceding maturity.
Paraiso, C. Z., Pan., IV, 24, 1911, (Busck), 2 ♂.
Old Panama, Pan., XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 2 ♂, 1 ♀.
Panama City, Pan., XI, 1913, (Zetek), 1 ♀, [United States National Museum].
Chorrera, Pan., V, 17, 1912, (Busck), 1 ♀.

Xestoblatta festae (Griffini)

1896. *E[pilampra] festae* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 2. [[♀], Punta de Sabana, Darien.]
1916. *Xestoblatta festae* Hebard, Trans. Am. Ent. Soc., xlii, p. 377, pl. xix, figs. 8 to 11. [Detailed discussion of both sexes.]

Porto Bello, Panama, IV, 20, 1912, (Busck), 1 ♀.
Gatun, Canal Zone, Pan., VII, 19 to 22, 1916, (Harrower), 1 ♀.

Xestoblatta immaculata new species (Plate IV, figure 16.)

This, one of the finest species of the Group Ischnopterites, is readily distinguished from any of the described forms of the present genus by its larger size, immaculate and paler coloration and form of interocular space. The male genitalia will probably be found to be very distinctive.

In linear arrangement we would place this species after the highly colored *X. nyctiboroides* (Rehn) and before *X. carrikeri* Hebard. It appears to represent a distinctive type, as does *nyctiboroides*. The decided width of the interocular space and proportions of the joints of the maxillary palpi show nearer agreement with *carrikeri*.

Type.— ♀; Alhajuela, Panama. March 10, 1912. (A. Busck.) [United States National Museum.]

Size very large and form broad for the Group. Head with interocular space very broad; narrower ventrad (dorsad 1.8, ventrad 1.1 millimeters), due to the internal margins of the eyes being moderately convergent, not subparallel as in the other known species of the genus; least interocular width equal to that between the ocelli, little less than that between the antennal sockets, these proportions much as in the female sex of *carrikeri*. Ocellar spots distinct, not well developed as in *Ischnoptera*, ocellar area weakly defined. Pronotum as characteristic of the genus, evenly and

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distinctly convex; lateral margins very feebly cingulate; greatest width meso-caudad; caudal margin transverse, but showing a broad and weak convexity mesad. Tegmina and wings broad and reaching slightly beyond the cercal apices; venation as characteristic of the genus, veins numerous (ulnar vein of wing with five complete and seven incomplete branches). Sixth dorsal abdominal segment with latero-caudal angles sharply rectangulate, not produced caudad; seventh segment with a heavy rounded chitinous projection laterad on each side; eighth segment simple.

Supra-anal plate rotundato-trigonal produced between the cerci, length distinctly less than half the basal width, less strongly chitinous toward apex with free margin supplied with hairs. Subgenital plate very ample, strongly convex; free margin convex, flattened toward cerci, narrowly curled dorsad in median portion, this brief area showing a medio-longitudinal cleft or sulcation. Limbs and armament of same as characteristic of the genus. Four proximal caudal tarsal joints supplied disto-ventrad with moderately large rounded pulvilli. Arolia small.

Head immaculate ochraceous-tawny, eyes blackish mummy brown. Ocelli and proximal antennal joint pale ochraceous-tawny, antennae cinnamon brown. Maxillary palpi pale ochraceous-tawny, the distal joint ochraceous-tawny. Pronotum immaculate zinc orange tinged with tawny, deepening slightly to tawny along caudal margin. Tegmina translucent, tawny, except costal field which is ochraceous-buff with feebly cingulate margin tawny. Wings transparent, with a faint tawny tinge, except in area of costal veins where they are tinged with buffy, becoming weak tawny in entire distal portion of anterior field. Mesonotum, metanotum and dorsal surface of abdomen ochraceous-buff, shading to dull ochraceous-orange in distal portion of abdomen. Cerci cinnamon brown. Ventral surface of abdomen tawny, deepening to russet on subgenital plate. Limbs ochraceous-tawny, deepening to tawny on tibiae and tarsi.

Length of body, 22.5; length of pronotum, 5.9; width of pronotum, 7.8; length of tegmen, 21; width of tegmen, 6.8; length of wing, 18.8; depth of wing, 12; length of caudal tibia, 8.2; length of cercus, 3.9 millimeters.

In addition to the type, two immature examples, taken at Porto Bello, Panama, February 28, 1911 and April 20, 1912, by Busck, are before us. These have the head, pronotum and cerci sanford's brown, the remaining portions blackish chestnut, the tarsi distinctively marked with buffy in a very broad annulus on the metatarsus and the proximal portion of the ultimate tarsal joint. Their length is 10.2 and 12.4 millimeters respectively.

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EUPHYLLODROMIA Shelford

1908. *Euphyllodromia* Shelford, Gen. Ins., 73me fasc., Orthoptera, Blattidae, Phyllodromiinae, p. 17.

This name was proposed as of subgeneric value for the American species previously assigned to *Pseudophyllodromia* Brunner.[110] We consider that it represents a unit of full generic value.

In the subgenus were included twelve species. GENOTYPE; here selected.—[*Blatta*] *Euphyllodromia angustata* (Latreille).

The following features are considered of generic diagnostic importance. Size small, structure extremely delicate. Head very broad, not covered by pronotum. Eyes well separated and prominent, projecting laterad. Pronotum transverse, lateral margins weakly deflexed, oblique sulci of disk weak. Tegmina fully developed in both sexes; discoidal vein angulate near apex of anal field; discoidal sectors few (three), with intermediate veins, which become obsolete proximad, longitudinal. Wings narrow; costal veins thickened in distal half, ulnar vein with few branches (one to four, the latter number due to further distal ramification of the branches), intercalated triangle very narrow. Dorsal surface of male abdomen with sixth segment specialized mesad, the segments showing further specialization of the latero-caudal angles. Female subgenital plate strongly cleft meso-distad. Ventro-cephalic margins of cephalic femora armed with a few heavy spines, succeeded by a more closely placed row of minute chaetiform spines, terminating in three heavy spines, elongate in increasing ratio distad. Fourth tarsal joint alone supplied with a large pulvillus which occupies its entire ventral surface.[111] Tarsal claws unspecialized. Arolia small.

[110] The genotype of that genus is *Pseudophyllodromia ornata* Brunner, from the Philippines, selected by Rehn, Trans. Am. Ent. Soc., xxix, p. 261, (1903).

[111] In addition to the very different tegminal and wing venation, we note from material of *Pseudophyllodromia laticeps* (Walker) that the three proximal tarsal joints are all supplied ventrad with small pulvilli, the fourth with a pulvillus as described above. We regret that we have no material of the genotype of *Pseudophyllodromia* before us.

Specimens of *Pseudophyllodromia pulcherrima*, described as an aberrant species by Shelford, received from that author, show that the species represents a genus distinct from that of *laticeps*.

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Euphyllodromia angustata (Latreille) (Plate IV, figure 17.)

1811. *Blatta angustata* Latreille, in Humboldt and Bonpland, Recueil. Observat. Zool. et Anat. comp., i, p. 146, pl. xv, fig. 9. [Vera Cruz, [Vera Cruz, Mexico.]]

Gatun, Canal Zone, Panama, (Jennings; 2 from bush), 3 ♂, 1 ♀; VI, 1915, VII, 12 to VIII, 22, 1916, (Harrower), 8 ♂, 15 ♀, 6 juv.

Lion Hill, C. Z., Pan., VI, 18, 1907, (Busck), 1 ♀.

Alhajuela, Pan., IV, 5 and 18, 1911, (Busck), 1 ♂, 2 ♀.

Rio Trinidad, Pan., III, 14 to V, 2, 1911 and 1912, (Busck), 3 ♂, 1 juv.

Tabernilla, C. Z., Pan., IV, 27, 1907, (Busck), 1 ♂.

Paraiso, C. Z., Pan., I, 16 to II, 10, 1911, (Busck, Schwarz), 3 ♂, 1 ♀.

Cabima, Pan., V, 24 to 28, 1911, (Busck), 1 ♂, 2 juv.

Arajan, Pan., IV, 28, 1911, (Busck), 1 ♀.

Argas, Pan., IV, 28, 1911, (Busck), 1 ♂, 1 ♀.

The immature examples of this insect are as handsome as the adults, but very different in color and color pattern (see plate IV, fig. 17). These are solidly black dorsad with a very narrow medio-longitudinal buffy line and the lateral margins more broadly of the same coloration. The antennae are black, with a broad medio-proximal and broader medio-distal annulus of white. The cerci are black, fading proximad and distad to buffy.

When we consider that the very complex color pattern of the adult appears only after the last moult, it is surprising to find it as extremely constant as is shown by this and other considerable series of the species at hand.

In the adult condition the maxillary palpi are always whitish, never showing darker markings or suffusions.

Euphyllodromia decastigmata[113] new species (Plate IV, figures 18 to 20.)

The present species shows nearest relationship to *E. angustata* (Latreille), differing in its slightly smaller size, absence of a medio-longitudinal pale line on the pronotum, distinctly shorter tegmina, differently marked mesonotum and metanotum and distinctive styles of the male subgenital plate, which are much more elongate and produced than in any other species of the genus known to us.

Type.— ♂; Gatun, Canal Zone, Panama. July 28 to August 6, 1916. (D. E. Harrower.) [Hebard Collection, Type no. 489.]

Size small for the genus, form and very delicate structure normal. Head with interocular space (.35 millimeter) about one-third width between antennal sockets. Ocellar spots small and weakly defined. Maxillary palpi with fourth joint approxi-

[113] In allusion to the ten pale markings found on the pronotum.

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mately as long as third, widening evenly and gently distad, so that it becomes twice as broad as the third joint; fifth joint three-quarters as long as fourth, moderately expanded, greatest width near base, ventral margin from that point nearly straight, oblique to apex. Pronotum strongly transverse; cephalic margin truncate; lateral margins rather strongly convex, this greatest caudad; caudal margin transverse but slightly and broadly rotundato-angulate produced mesad; discal sulci very weak. Tegmina and wings less ample than in *angustata*, length approximating body length, not as in that species decidedly greater than body length.

Dorsal surface of abdomen with second and third segments showing a weak longitudinal ridge along the lateral margins; fourth, fifth and sixth segments with similar ridges more pronounced and oblique, extending to the caudal margin a distance from the latero-caudal angle. Sixth dorsal segment weakly depressed mesad and bearing there an inconspicuous tuft of agglutinated hairs, less heavily chitinous in median section with caudal margin there very feebly and broadly concave. Seventh dorsal segment narrowly projecting, on each side forming a raised oval, transverse to the body length, its cephalic and internal margin formed by a moderately decided ridge, this segment showing no medio-longitudinal ridge, caudal margin broadly concave between these areas. Eighth dorsal segment very narrowly projecting, its caudal margin convex.

Supra-anal plate strongly transverse, showing a broad and weak triangular production between cercal bases with rounded apex obtuse-angulate. Cerci small, elongate and slender, tapering to acute apex; dorsal surface flattened, ventral surface of each joint convex with lateral margins strongly cingulate, the latero-external margins the more so. Paired plate beneath supra-anal plate large and unspecialized.

Concealed genitalia complex.[113] Subgenital plate symmetrical, surface with a flexure dorsad toward the free margin; sinistral margin straight, oblique to median portion, dextral margin oblique to median portion with a moderate obtuse-angulate convexity; median portion with two deeply inset and smoothly rounded styliform plates which taper and are attingent distad (suggesting the type found in *Chorisoneura*), four-fifths as long as distance from their base to margin of preceding segment, between these styles is a very thin plate, slightly over half as long, with ventral margin armed with minute sharp recurved teeth.

Armament of limbs, pulvilli, tarsal claws and arolia as given here in generic diagnosis. Succeeding tarsal joints only three-fourths as long as caudal metatarsus.

Allotype.— ♀ ; Porto Bello, Panama. February 15, 1911. (E. A. Schwarz.) [United States National Museum.]

Agrees closely with type in coloration, color pattern and length of organs of flight. Body somewhat larger. Interocular space scarcely wider. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, very broadly bilobate,

[113] In almost all the material of the genus at hand, the concealed male genitalia have been crushed, owing to the extremely delicate structure of the abdomen. It will consequently be a most difficult matter to consider these organs, except in specimens which are fresh or have been kept in liquid preservative.

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length about one-fifth proximal width. Subgenital plate with lateral margins feebly convex and weakly convergent to beneath cerci, thence straight to distal portion, which is strongly V-emarginate, with sides of emargination convex, the interval occupied by a mantle which is not chitinous, the apices of the plate thus formed rather bluntly rounded, weakly acute-angulate, supplied with setae.

Head with vertex cinnamon rufous, paling to ochraceous-buff toward labrum; eyes tawny; ocellar spots buffy. Antennae mummy brown, except proximal joint and ventral surface of succeeding joint which are buffy. Maxillary palpi with proximal and third joints white suffused with mummy brown, fourth and fifth joints white. Pronotum shining, lateral margins transparent, buffy; disk blackish chestnut brown except for the following markings, cephalic margin very narrowly warm buff with a brief linear median invasion of this color running into the disk, just before the lateral margins of the disk are three small linear flecks on each side of which the cephalic pair are the largest, linear and divergent caudad; in addition there is a pair of similar linear flecks mesad, which are parallel, and a single fleck mesad near the caudal margin. Mesonotum with a medio-longitudinal fleck of warm buff, dark chestnut brown on each side, paler laterad. Metanotum dark chestnut brown with a pair of warm buff flecks caudad.

Tegmina transparent, buffy, except in portion from apex of anal field to distal portion of costal margin, which portion is translucent, heavily washed with ochraceous-tawny proximad, becoming weaker with less of an orange tinge distad; in the proximal portions of the tegmina all of the veins, the anal sulcus and the area between the anal sulcus and the last of the veins of the anal field are chestnut brown (the ulnar vein is obsolete before the apex of the anal field, this area resultantly the largest of the transparent areas).

Wings transparent, feebly suffused distad, veins chestnut brown, the half of the costal veins toward the costal margin solidly chestnut brown. Dorsal surface of abdomen ochraceous-tawny, except median segment which is dark chestnut brown. Cerci with dorsal surface whitish, suffused along the internal margins with dark chestnut brown. Coxae and ventral abdominal segments laterad with suffusions of mummy brown, these forming a broad interrupted band on each side of the abdomen, the remaining portions of which are buffy. Limbs buffy; dorsal surfaces of femora and tibiae washed with mummy brown, ventral margins of femora (frequently in the series) tinged with mummy brown, this heaviest on the caudal femora; all spines faintly tinged with tawny, a minute delicate fleck of mummy brown at the base of each.

The female sex of this species is very similar in coloration. The dorsal surface of the abdomen is frequently suffused with chestnut brown laterad and caudad, the third segment with latero-caudal angles briefly buffy.

It is to be noted that numerous features of color pattern and coloration are of great specific diagnostic importance in the species of the present genus.

The immature condition is widely different in coloration from the adults and from the immature condition of *angustata*. In these the lateral margins of the fifth

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dorsal abdominal segment are buffy, the remaining portions of the pronotum, mesonotum and metanotum brown, with a strong orange tinge, the mesonotum broadly blackish chestnut brown before the lateral margins. The abdomen dorsad is blackish chestnut brown, except for the following buffy markings; a medio-longitudinal narrow band to and including the fourth segment; fifth segment with a median transverse narrow band; sixth segment with a dot on each side; seventh segment with all of proximal portion; eighth and ninth segments concealed. Supra-anal plate buffy with a marginal suffusion of brown. Cerci buffy with a suffusion of brown on their internal surfaces. Antennae each with two conspicuous white annuli as in *angustata*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *type*	8.5	2.1	3.5	8.7	2.7
Tabernilla, *paratype*	8.7	2.2	3.5	9	2.7
♀					
Porto Bello, *allotype*	9	2.3	3.6	8.7	2.8
Porto Bello, *paratype*	9.1	2.4	3.7	8.9	2.8
Alhajuela, *paratypes* (4)	8.1–9.5	2.2–2.5	3.7–3.8	8.9–9.2	2.8–3

In addition to the type and allotype, the adults of the following series may be considered paratypes.

Porto Bello, Panama, III, 1 and 13, 1911, (Busck) 2 ♀; VIII, 18 at 21, 1916, (Harrower), 1 juv.

Gatun, Canal Zone, Pan., VII, 28 to VIII, 5, 1916, (Harrower), 5 juv.

Alhajuela, Pan., IV, 17, 1911, (Busck), 5 ♀.

Tabernilla, C. Z., Pan., IV, 27 to VI, 4, 1907, (Busck), 2 ♂, 1 ♀.

Pseudomops gloriosa new species (Plate V, figures 1 to 3.)

This insect belongs to the section of the genus having non-spatulate cerci and to the large and distinctively colored forms of the same, of which nearest relationship is with *P. grata* Rehn.

From that species the present differs in the black head, tegmina with an elongate triangular pale orange area with base of triangle on the costal margin, black limbs with coxae narrowly margined proximad with orange and black abdomen except for a small meso-proximal suffusion of orange.

To this group undoubtedly belongs *P. bicolor* Shelford and probably also *P. magna* and *P. albostriata*, described by that author.

Type.— ♀; Cabima, Panama. May 28, 1911. (A. Busck.) [United States National Museum.]

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Size large for the genus; form elongate, graceful, as in *grata*. Head with eyes widely separated, interocular width least dorsad, nearly twice that between antennal sockets, ocellar spots very small. Maxillary palpi with third joint slightly longer than fourth, fifth joint enlarged and about one and one-fifth times as long as third joint. Antennae longer than body, heavily plumose in proximal two-fifths, this heaviest in distal section of this portion. Pronotum rather elongate, decidedly broader caudad than cephalad; cephalic margin truncate, caudal margin broadly obtuse-angulate convex. Tegmina and wings elongate and slender. Tegmina with numerous regular costal veins and (six) longitudinal discoidal sectors. Wings with costal veins weakly thickened throughout almost their entire length; ulnar vein with(two) complete branches which spring from the proximal half of the vein.

Supra-anal plate triangularly produced, about half as long as basal width, sides of produced portion feebly concave to broadly rounded apex. Cerci slender, flattened dorsad, segments (thirteen) strongly convex ventrad with lateral margins cingulate. Subgenital plate broad, transverse, evenly convex, free margin broadly and evenly convex. Limbs elongate and slender. Ventro-cephalic margin of cephalic femora armed with a few elongate heavy spines, succeeded by a row of closely placed short but moderately stout spines, terminating in three heavy spines elongate in increasing ratio distad. Four proximal tarsal joints each supplied ventro-distad with a very small pulvillus. Tarsal claws simple, delicate. Moderately well developed arolia present.

Head, ventral surface and limbs shining black, except ocellar spots, brief suffusions at bases of coxae and suffusion meso-proximad on abdomen which are pale orange. Antennae black, except for a white annulus which includes the first seven joints beyond the plumose portion. Pronotum shining orange-rufous except for the produced caudal portion which is black, the cephalic margin of this area sharply defined, transverse but somewhat undulating. Tegmina weakly translucent, black except for a roughly triangular solid area of pale orange which occupies nearly half the tegminal surface, its base the proximal three-quarters of the costal margin, its apex broadly truncate, situated just beyond the angulation of the ulnar vein; the concealed portion of the dextral tegmen when at rest broadly suffused with pale orange medio-longitudinally, there transparent. Wings black at base and apex of anterior field, area of costal veins pale orange, other portions transparent, pale orange, the base and free margin of the radial field broadly tinged with black. Remaining dorsal surface of insect shining black. Cerci black proximad with distal three-fifths whitish.

Length of body, 13; length of pronotum, 4.9; width of pronotum, 4.9; length of tegmen, 14.5; width of tegmen, 3; length of wing, 13; width of wing, 5.6; length of cercus, 3.3; length of caudal tibia, 6.1 millimeters.

The type of this beautiful species is unique.

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Subfamily NYCTIBORINAE

We would note that in all the species of the genera *Nyctibora*, *Eunyctibora* and *Paratropes* at hand, the tarsal claws are distinctive in being asymmetrical, the cephalic claw being decidedly shorter than the caudal claw, and not or very slightly projecting beyond the arolium. In *Megaloblatta*, however, the tarsal claws are symmetrical, the arolia subobsolete, represented by a small chitinous node between the bases of the tarsal claws.

Nyctibora noctivaga Rehn (Plate V, figure 4.)

1896. *N[yctobora] mexicana* Griffini (not of Saussure, 1864), Boll. Mus. Zool. Anat. comp. Univ. Torino, ix, no. 236, p. 2. [One specimen; Lake Pita, Darien.]

1903. *Nyctibora noctivaga* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♂; Machuca, San Juan River, Nicaragua.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 5, 1916, (Harrower; from banana stalks), 3 juv.

Paraiso, C. Z., Pan., (Schwarz), 1 ♂; I, 8 and II, 7, 1911, (Busck), 2 juv.

Cabima, Pan., V, 30, 1911, (Busck), 1 ♀.

The distinctive male supra-anal plate of this insect, the largest of the uniformly dark species of the genus, is here figured.

The extremes in pronotal and tegminal proportions are rather decided, in a series of three males and four females now before us, including the type, being as follows: pronotum, ♂, 8.8 to 9.8 by 12.8 to 14, ♀, 9 to 10.8 by 14 to 15.3; tegmina, ♂, 37.8 to 41.8 by 14.6 to 16.2, ♀, 35.9 to 42 by 14.5 to 17.2 millimeters. The maximum is shown by a pair from Jamaica, the pair from Panama approach the minimum.

Eunyctibora nigrocincta (Shelford)

1907. *Nyctibora nigrocincta* Shelford, Ann. Mag. Nat. Hist., (7), xix, p. 37. [♂, ♀; Colombia.]

1908. *E[unyctibora] nigrocincta* Shelford, Gen. Ins., 74me fasc., Orth., Blattidae, Nyctiborinae, p. 2, pl., fig. 1. (Colored dorsal view.)

Ancon, Canal Zone, Panama, VI, 1913, (Zetek), 1 ♀, [Hebard Collection].

Bocas del Toro, Pan., VII, 1 to 10, 1908, (Wirt Robinson), 1 ♂, [United States National Museum].

Paratropes bilunata Saussure and Zehntner

1893. *Paratropa bilunata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 60. [♀; Bugaba, Panama.]

Bugaba, Panama, (W. Schaus), 1 ♂, [Hebard Collection].

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Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
San Carlos, Costa Rica ..	21.3	5	8.7	22.8	8.1
Bugaba, Panama, *topotype*	20.1	5	8.8	22.8	8.7
♀					
San Carlos, Costa Rica..	18.5	5	8.6	20.3	8.8
Turrialba, Costa Rica...	17.5	5	8.8	20.8	8.8

The pronotal coloration, dark and immaculate except for two large pyriform yellowish-buff markings at the cephalic margin on each side, readily distinguishes this handsome species. The tegmina have a large patch of similar coloration proximad on the marginal field.

Paratropes pinoganae new species (Plate V, figure 5.)

This insect is very closely related to *P. phalerata* (Erichson), but differs in the following features. Pronotum with dark marking having the meso-cephalic invasion of the pale cephalic marginal band with apex broad and truncate, showing no small median triangular production; tegmina and wings shorter;[114] tegmina with dark margin of proximal two-thirds of costal margin wider and dark band at humeral trunk twice as wide as oblique band of sinistral tegmen, not of nearly equal width; dark marginal band of radiate field of wings much narrower; cerci pale, not black.

It is probable that series will show variation in some of the above features, but that the present insect will prove a valid species with even more distinctive features in the male sex, when this is known, is our belief.

Type.— ♀ ; Pinogana, Darien, Panama. December, 1915. (Muñoz.) [Hebard Collection, Type no. 491.]

Size medium, form broad as in the majority of the species of the genus.[115] Head with interocular space (.4 millimeter) about two-fifths that between the minute but

[114] Much as in females of *P. bilunata* Saussure and Zehntner; a female of *phalerata* from Trinidad has instead the tegmina and wings as elongate as in males of *bilunata*.

[115] We have given the following full structural description of the species, realizing that the majority of the features remarked are rather of generic than of specific diagnostic value. In this genus, color characters have been used almost exclusively for specific diagnoses, particularly in the female sex, and in certain features are undoubtedly among the most important for specific differentiation.

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very distinct ocellar spots; face much flattened, polished, well supplied with short white hairs which spring from microscopic pits;[116] eyes not extending below antennal sockets; lateral margins of cheeks feebly convex convergent to clypeal suture. Antennae heavy and plumose in proximal two-thirds, this increasing distad, distal third slender and non-plumose. Maxillary palpi short; fourth joint about three-fifths as long as third, bent ventrad in narrow proximal neck, thence expanding decidedly to apex; fifth joint heavy and enlarged, springing from ventral three-fourths of apex of fourth joint. Pronotum with cephalic margin broadly convex, caudal margin more strongly convex, lateral angles rounded at distinctly less than a right angle; surface showing broad concavities latero-cephalad. Tegmina and wings fully developed, extending well beyond the abdominal apex, but not as elongate as in this sex of *phalerata*.

Supra-anal plate broadly produced between cercal bases, length about three-quarters proximal width, margin convex. Cerci short, extending but slightly beyond supra-anal plate with apex broadly rounded; dorsal surface deplanate with sutures of (seven) segments weakly defined, lateral margins straight; ventral surface with segments weakly convex and lateral margins very narrowly and weakly cingulate.

Subgenital plate broad, truncate; surface weakly convex, except laterad where it is rather decidedly concave; lateral portions deep before cercal bases, with latero-caudal margins more broadly rounded than those of preceding segment, thence the free margin is broadly concave to beyond the cercal bases, rounding broadly into the broad and very feebly convex distal portion.

Cephalic femora with ventro-cephalic margin supplied with a fringe of moderately short hairs, armed distad with two heavy elongate spines, of which the more distal is the longer; ventro-caudal margin unarmed except for a smaller distal spine. Ventro-cephalic margin of median and caudal femora armed with a single small but stout spine and a larger distal spine. Ventro-caudal margin of median and caudal femora armed in median portion with two slightly longer spines, with no distal spine. Tarsi short and stout, proximal four joints unarmed, supplied with large pulvilli, which occupy the entire ventral surface of each joint except the proximal third of the caudal metatarsus, which is shaped into a rather strong longitudinal ridge. Tarsal claws simple, asymmetrical, the cephalic claw much shorter than the caudal claw, not extending beyond the apex of the large arolium.

Head, antennae and underparts shining black, except ocellar spots and sutures of mouthparts which are buffy, and abdomen which is margined laterad and caudad by a broad band of ochraceous-buff (paler in the paratype, except on the subgenital plate where this marginal band is tinged with ochraceous-orange toward its internal margin). Pronotum black with a broad cephalic marginal band of ochraceous-buff having an orange tinge, this broader laterad, with its caudal margins there broadly convex, mesad with median invasion of black area broad, straight, transverse; two rounded rectangulate spots of the same pale color occur mesad at the caudal margin of the pronotum, separated by an interval of the same length.

[116] The ventral surface, femora and tibiae are similarly supplied with such hairs.

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Tegmina translucent in pale portions, ochraceous-tawny tinged with orange (in the paratype this becoming gradually slightly weaker proximad in the costal field); all but distal third of costal margin black (in type, .65, paratype, .9; in female of *phalerata* at hand, .45 millimeter in width). Sinistral tegmen with sutural margin, including apex, more broadly margined with blackish brown, this even wider on dextral tegmen but not extending proximad of anal field. Sinistral tegmen with a broad humeral band (in type and paratype, 2.1 millimeters in width) and a narrower oblique band (in type, 1, in paratype, 1.2 millimeters in width), the latter springing from the proximo-internal angle of the anal field, these black in color and fusing just before the apex of the tegmen (in the examples of *phalerata* at hand these bands are subequal, 1.6 millimeters, in width). The humeral band is the same on the dextral tegmen to the portion concealed when at rest, where these markings are almost obliterated, the band which joins it distinct only along the decided oblique sulcus.

Wings transparent, ochraceous-tawny with an orange tinge; anterior field broadly margined distad with blackish brown (width mesad in type, 1.8, in paratype, 1.6 millimeters; in specimen of *phalerata*, 1.1 millimeters); radiate field very broadly bordered with blackish brown which narrows proximad, its internal margin concave, not nearly straight as in *phalerata* (at fold of wing, 5, proximad, 1; in female of *phalerata* at fold of wing, 8, proximad, 2.5 millimeters). Mesonotum and metanotum shining black. Dorsal surface of abdomen shining black, very broadly margined laterad with ochraceous-buff tinged with orange, some of the distal segments with free margin very narrowly of this color and all but a very narrow proximal portion of the supra-anal plate of this color. Cerci ochraceous-buff, suffused with brown dorso-distad.

Measurements (in millimeters)

♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmem	Length of caudal tibia
Paratropes pinoganae						
Pinogana, *type*	15.8	5.3	9.2	18.8	8	5.8
Corozal, *paratype*...	16	5.3	9.2	19.4	8.3	6
Paratropes phalerata						
Arima, Trinidad....	17.4	5.8	9.7	21.8	8.5	6.1

In addition to the type, a female paratype from Corozal, Canal Zone, Panama, taken at light on May 12, 1913, by Zetek, is in the Hebard Collection.

Megaloblatta blaberoides (Walker)

1868. *Epilampra blaberoides* Walker, Cat. Dermapt. Saltat. Brit. Mus., v, Suppl. Blatt., p. 12. [♂, ♀; Chontales, Nicaragua.]

1887. *Megaloblatta rufipes* Dohrn, Stett. Ent. Zeit., xlviii, p. 409. [♂, Panama.]

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Gatun, Canal Zone, Panama, VII, 25 to 31, 1916, (Harrower; under bark on tree), 1 ♂.

Cabima, Pan., V, 21, 1911, (Busck), 1 large juv. ♂.

Compared with the closely allied *M. longipennis* (Walker), of which a female from Ecuador is at hand, Costa Rican females of the present huge species are found to differ only in the much broader head, with interocular space much broader.[117]

The great expanse of this insect is realized when we consider that the tegmina of the present male measure 82 by 33.2 millimeters.

Subfamily EPILAMPRINAE

AUDREIA Shelford

1910. *Audreia* Shelford, Gen. Ins., 101me fasc., Orthoptera, Blattidae, Epilamprinae, p. 11.

The genus included eight species. *Genotype:* here selected.—*Audreia carinulata* [*Calolampra carinulata*] (Saussure).

First steps only have as yet been taken to separate properly the generic units related to *Epilampra*, in which partial to complete reduction in the organs of flight has occurred. At the present time, as was the case with Shelford in 1910, insufficient material is at hand to allow a proper revision to be made. A number of species are before us which must be assigned to this genus as characterized by Shelford, but which indicate the presence of at least four distinctive groups, though females alone of the majority of species are represented. Larger series and male examples will be needed before it can be determined whether these groups represent distinct genera, or are simply striking divisions in the genus *Audreia*, comparable to the many striking divisions in the genus *Epilampra* as at present defined.

Added difficulty is found in the fact that a similar situation is encountered in the allied genus *Calolampra* Saussure, the genotype of which is the Australian *C. irrorata* (Fabricius).[118]

Whether the tegmina and wings are reduced, truncate, lateral and lobiform, or absent, are features which in the Blattidae are known to be often utterly worthless from a generic standpoint.

[117] Interocular width: *M. blaberoides*, ♂, 1.7, ♀, 2.4; *M. longipennis*, ♀, 1.4 millimeters.

[118] The genotype of *Calolampra*, *Epilampra gracilis* Brunner, a synonym of *irrorata* according to Shelford, was selected by Rehn, Trans. Am. Ent. Soc., xxix, p. 274, (1903).

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That *carinulata* and *irrorata* are generically distinct we feel certain, from study of a female of the former and paratypes of both sexes of the latter. Without the sexes of each species, we do not feel in a position to characterize *Audreia* more definitely than has been done in the meager description given by Shelford.

Audreia bromeliadarum Caudell

1914. *Audreia bromeliadarum* Caudell, Insec. Inscit. Menst., ii, p. 78. [♀; Upper Pequini (=Pequeni) River, Panama.]

Upper Rio Pequeni, Panama, III, 1909, (Jennings), 1 ♀, *type.*
Rio Trinidad, Pan., III, 29, 1912, (Busck), 1 juv.

In addition to the data given in the original description, we would note the following features for the type of this species. Entire dorsal surface heavily but minutely impresso-punctate. Dorsal abdominal segments with a row of small nodes near caudal margin of each (seventeen is the maximum number), these less strongly defined on mesonotum and metanotum and obsolete, except under a lens, on the pronotum. Cephalic femora with ventro-cephalic margin well supplied with a fringe of hairs, which are more numerous and closely placed distad, succeeded by two short distal spines, the more distal of which is twice as long and heavy as the more proximal; ventro-caudal margin armed with two widely placed short spines. Median and caudal femora with ventral margins armed with two to three and one distal similar spines; these with a single short heavy genicular spine dorsad. Tarsi unarmed ventrad, caudal metatarsus with pulvillus occupying all but proximal fifth of ventral surface, succeeding three joints with large pulvilli occupying their entire ventral surfaces. The pulvilli are moderately bilobate distad, that of the fourth with cephalic lobe (the internal lobe of the cephalic tarsi) produced and curved over the caudal lobe in a soft claw-like projection.

Audreia gatunae new species (Plate V, figure 6.)

This is a distinctive species, striking in its large size, broad form, convex and polished dorsal surface, with abdominal segments showing the characteristic minute linear ridges toward their caudal margins, subquadrate tegmina and broad, smooth and polished head, with occiput pale and face flattened, evenly and very feebly convex.

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Compared with females of *A. carinulata* (Saussure), known only from Costa Rica, the female at hand is found to differ in its vastly greater size, slightly broader form, more strongly truncate tegmina, less convex face, greatly reduced arolia, paler vertex and even more weakly paler lateral margins of the pronotum and costal field of the tegmina.

Type.— ♀ ; Gatun, Canal Zone, Panama. July 28 to August 5, 1916. (D. W. Harrower.) [Hebard Collection, Type no. 492.]

Size very large, form broad for the genus. Head with vertex smooth, projecting beyond pronotum, rounding suddenly into the smooth and flattened, weakly convex, face; interocular space very broad (2.7 millimeters), only slightly narrower than that between antennal sockets; ocelli represented by small dots. Antennae slender and very short, length very close to pronotal width; length of third joint slightly over twice its width. Pronotum smooth, surface broadly convex except laterad where it is feebly concave; margin cephalad weakly convex, showing some truncation above head, lateral portions feebly cingulate; latero-caudal angles acute and sharply rounded, forming an angle distinctly less than ninety degrees; caudal margin broadly concave on each side, forming a very weak and broadly rounded median production. Tegmina coriaceous, polished, subquadrate, veins appreciable only, costal margins cingulate; production greatest at costal margin, angle there acute, sharply rounded; distal margin oblique to sutural margin, angle there obtuse, rounded, thus leaving a brief median portion of the metanotum exposed. Abdomen with median width greater than width of any other portion of insect; dorsal surface polished, distal half of each segment with small, very low, longitudinal ridges (maximum number twelve), the latero-caudal angles of each segment produced in a minute sharp tooth.

Supra-anal plate polished but microscopically irregularly striate, about half as long as proximal width, lateral margins broadly convex to a small obtuse-angulate median emargination, before which the surface of the plate is very briefly sulcate. Cerci very short and stout, tapering sharply in distal portion to acute apex; dorsal surface moderately convex and polished, showing the sutures of seven segments, the lateral margins of which are feebly convex; ventral surface strongly convex, clothed heavily with short stout hairs and a few very elongate slender hairs, lateral margins broadly deplanate, the external slightly more than the internal. Subgenital plate large, broad, evenly convex and polished; its free margin slightly within the lateral margins of the sixth dorsal abdominal segment and closely following the free margin of the supra-anal plate, broadly and feebly concave at the cercal bases, the convexity greatest between the cerci.

Cephalic femora with ventro-cephalic margin armed with four heavy and moderately elongate spines, succeeded by a series of moderately widely spaced small chaetiform spines, terminating in two heavy spines, of which the more distal is twice the length of the more proximal; ventro-caudal margin armed with (three and four

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and one distal)[119] heavy and moderately elongate spines. Cephalic tibiae slightly over three times as long as greatest width. Median and caudal femora with cephalic margin armed with (three and one distal) heavy and elongate spines; caudal margin armed with (two and four and one distal for median femora, four and no distal for caudal femora) more elongate spines. Caudal metatarsus distinctly longer than combined length of succeeding joints, its ventral surface with two rows of short stout spines which diverge distad about the small globose pulvillus; second joint similar, but with rows of spines very short; third joint similar, but with proximal half unarmed; fourth joint with pulvillus occupying its entire ventral surface, with a few spines laterad. Arolium present only as a small node between base of claws.

General coloration of dorsal surface blackish brown, the lateral portions of the pronotum, costal field of the tegmina, very narrow lateral margins and narrow caudal margins of the dorsal abdominal segments, except the minute ridges which are blackish, of a somewhat metallic prout's brown. Under high magnification the chitinous structure is seen to be translucent, tinged with ochraceous-tawny and overlaid with blackish brown, this absolutely solid only on the pronotum and proximal portions of the tegmina, breaking into spots and dots in the paler areas and there resultantly having somewhat the appearance of tortoise shell. Cerci buffy tinged with tawny. Head shining blackish brown, except the vertex which has a narrow irregular suffused band of light ochraceous-tawny between the eyes, with three irregular longitudinal lines of this color running caudad. Ocellar dots ochraceous-tawny. Antennae beyond first joint and mouthparts slightly paler than face and showing a tawny tinge. Ventral surface of abdomen shining black. Limbs with spines all russet. Coxae blackish mars brown, shading to slightly paler distad; femora deep russet; tibiae russet; tarsal joints buffy with ventral rows of spines russet.

Length of body, 30.3; width of head, 5.6; length of antenna, 13; length of pronotum, 8; width of pronotum, 12.8; exposed length of tegmen along humeral trunk, 7.1: exposed length of tegmen along sutural margin, 4.8; width of tegmen, 8.9; width across tegmina, 15.6; width across first abdominal segment, 15.8; greatest width of abdomen (across third abdominal segment), 16.6; length of cercus, 1.8; length of cephalic tibia, 3; length of caudal femur, 7.2; length of caudal tibia, 9.2; length of caudal metatarsus, 3.2 millimeters.

A series of immature individuals, representing three of the earlier instars, are of interest in showing the brief longitudinal ridges at the caudal margins of the dorsal abdominal segments and also on the pronotum, mesonotum and metanotum, relatively more decided than in the adults. These specimens are not as polished and not as solidly dark, appearing dark prout's brown shading to prout's brown, while the smallest show a vague but broad medio-longitudinal dorsal abdominal band preceded on the metanotum by an inverted "V" of slightly paler coloration.

The antennae are, however, of particular interest. In the adult they are unicolorous with fifty-seven joints. In the instar fourteen millimeters in length they have thirty to thirty-seven joints, of which the fourteenth to sixteenth are

[119] On one side the distal spine is atrophied, a minute socket alone showing. A certain amount of general atrophy is shown by the structure and irregularity of the spines.

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very faintly paler brown, the three joints preceding the last joint white. In the instar eleven millimeters in length they have twenty-nine joints of which the thirteenth to the fifteenth are very faintly paler brown, the three joints preceding the last joint white. In the instar eight millimeters in length they have twenty-four joints of which the tenth to the twelfth and the three joints preceding the last joint are white.

In all the arolia are of the same proportions as in the adult.

In addition to the type, the following series of immature examples is at hand.

Porto Bello, Panama, VIII, 18 to 21, 1916, (Harrower), 2 juv.
Gatun, Canal Zone, Pan., VII, 17 to VIII, 5, 1916, (Harrower), 3 juv.
Lion Hill, C. Z., Pan., VI, 18, 1907, (Busck), 1 juv.
Rio Trinidad, Pan., VI, 6, 1912, (Busck), 1 juv.

Epilampra azteca Saussure

1868. *Epilampra azteca* Saussure (in part), Rév. et Mag. de Zool., (2), xx, p. 356. [♂, Mexico.]

1870. *Epilampra azteca* Saussure (in part), Miss. Sci. Mex., Rech. Zool., vi, p. 82, pl. ii, fig. 45. (More detailed diagnosis and figure of wing.)

The Cuban material, originally included, and the South American material, later included by Saussure, represent distinct though allied species, described by Saussure and Zehntner in the Biologia Centrali-Americana.

Porto Bello, Panama, IV, 17 and 20, 1912, (Busck), 4 ♀; VIII, 18 to 22, 1916, (Harrower), 6 juv.
Gatun, Canal Zone, Pan., VI, 1915, (Harrower), 1 ♀, 1 juv.; VII, 17 to VIII, 22, 1916, (Harrower), 8 juv.
Rio Bejuco, Pan., (W. Schaus), 1 ♀.
Rio Trinidad, Pan., VI, 3, 1912, (Busck), 1 ♂, 1 ♀.
Paraiso, C. Z., Pan., I, 30 to II, 8, 1911, (Busck), 3 ♂, 1 ♀, 1 juv.
Cabima, Pan., V, 18 to 28, 1911, (Busck), 1 ♂, 3 ♀.
Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; in leaf litter in jungle), 1 ♀, 1 juv.
Panama City, Pan., 1913, (Zetek), 1 ♂, 1 ♀, [United States National Museum].
Chorrera, Pan., V, 14, 1912, (Busck), 1 ♂.

The present series shows but a moderate amount of variation. The three males from Paraiso are recessive in coloration, the pronotal picturing being cinnamon brown with chestnut flecks, rather than blackish chestnut brown as is usual. In such specimens the dark line and flecks along the humeral vein of the tegmina are also decidedly reduced and weakened. Additional material at hand, however, shows that this is by no means the extreme of recessive coloration attained in the species.

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This insect is apparently the most abundant species of the genus in Panama. Its small size and heavily pictured pronotum readily distinguish it from the other species here treated.

Epilampra maya Rehn (Plate V, figure 7.)

1902. *Epilampra maya* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♂; Machuca, Nicaragua.]

1914. *Epilampra sodalis* Caudell (not of Walker, 1868), Insec. Inscit. Menst., ii, p. 79. [♀, juv.; Porto Bello Bay, Panama.]

Porto Bello Bay, Panama, (Jennings; in bromeliads), 3 ♀.
Rio Trinidad, Pan., V, 9, 1911, (Busck), 1 ♂.
Chorrera, Pan., IV, 13, 1912, (Busck), 1 ♂.

This broad, medium sized, rather light brown species appears, from consideration of the series at hand, to be one of the most abundant forms of the genus in Central America.

Under *sodalis* of Walker, Kirby has placed *conspersa* of Saussure and Zehntner, which action has been followed, without comment, by Shelford. We believe, from careful study of the literature and material at hand, that Saussure and Zehntner correctly diagnosed *conspersa* of Burmeister, which species belongs to the group having beautifully marmorate and tessellate tegmina.

From Walker's insufficient description of *sodalis*, we would note the following differences for the present species; front not solidly black, dorsal surface of abdomen lacking black patches and pronotum without even an indistinct lyre-shaped marking. Were an adequate description of *sodalis* given, we feel satisfied that more decided features of difference could be stated.

The present species has not been recorded from South America, nor is it represented in the large series of unstudied material from that continent at hand.

Epilampra colombiana Saussure

1895. *Epilampra colombiana* Saussure, Rév. Suisse Zool., iii, p. 360, pl. ix, fig. 13. [♀, "Nova Granada" (=Colombia).]

1896. *Epilampra mexicana* Griffini (not of Saussure, 1862), Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 2. [♀; Lake Pita, Darien, [Panama].]

1898. *E[pilampra] colombiana* Giglio-Tos, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 311, p. 7. (Correcting Griffini's record and comparing this species with *mexicana*.)

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This species is extremely close to *E. mexicana* Saussure and may eventually prove to be a geographic race of that insect. The tegmina with humeral vein showing no darker blotches is the most striking difference in coloration for *colombiana*. Saussure's figure gives a very good idea of the markings characteristic of this insect.

Tabernilla, Canal Zone, Panama, V, 14, 1907, (Busck), 3 ♀.
Cabima, Pan., V, 22, 1911, (Busck), 1 ♀.
Chiriqui, Pan., 1 ♀, [Hebard Collection].

Epilampra mexicana Saussure

1862. *E[pilampra] mexicana* Saussure, Rév. et Mag. de Zool., (2), xiv, p. 228. [[♂], Mexico.]

1864. *Epilampra mexicana* Saussure, Mém. l'Hist. Nat. Mex., iv., p. 130, pl. ii, fig. 26. (Detailed diagnosis and color figure.)
Chorrera, Pan., V, 11 and 17, 1912, (Busck), 2 ♀.

The type is more intensive in coloration than the material here recorded, or specimens from Mexico and Guatemala before us.

HYPORHICNODA new genus

The present genus shows close relationship to *Rhicnoda* Brunner, differing in the greater reduction and different type of limb armament,[120] in the wings of the male which show a more strongly Polyphagine tendency, absence of both tegmina and wings in the female, and in the medio-longitudinal carina, which is distinct on pronotum and mesonotum in the male and decided on pronotum, mesonotum and metanotum in the female.

GENOTYPE: *Hyporhicnoda reflexa* [*Rhicnoda reflexa*] (Saussure and Zehntner).

Generic Description.—Sexes very dissimilar. Male with fully developed tegmina and wings, smaller than female, which lacks organs of flight. Head with surface of occiput polished but showing impressed punctae mesad, interocular-ocellar area depressed,

[120] An immature specimen of the genotype, *Rhicnoda rugosa* Brunner, from Goenong Soegi, Lampong, Sumatra, is in the collection of the Academy of Natural Sciences. This specimen has the ventro-cephalic margin of the cephalic femora armed with (five) moderately elongate, heavy spines, succeeded by a row of minute spines, which are closely placed distad, terminated by a single heavy spine; the ventro-caudal margin of the cephalic femora and the ventro-cephalic margin of the median and caudal femora are armed with (three and one distal) moderately elongate, heavy spines. The ventro-caudal margin of the median and caudal femora are armed with (median four and one distal; caudal three or four and no distal) shorter and lighter spines.

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thickly impresso-punctate and pitted. Eyes small, widely separated. Antennae short.

Pronotum extending well beyond head; margin cephalad subcingulate, evenly convex and moderately reflexed to latero-caudal angles, which are weakly produced caudad in female only; caudal margin in male weakly convex, in female weakly concave on each side, weakly convex mesad. Pronotum and mesonotum showing a medio-longitudinal carina, this continued on metanotum in female. Female with caudal margin of pronotum, mesonotum, metanotum and dorsal abdominal segments minutely but conspicuously beaded. Tegmina of male delicate, extending well beyond apex of abdomen, widest distad, apex broadly rounded; marginal and anal fields proximad impresso-punctate, remaining portions with veins showing numerous minute swellings but no hairs. Wings of male with anterior field extending much beyond radiate field; proximal portion of radiate field not folding when wings are closed, remaining portion folding as is usual in the Epilamprinae.[121] Dorsal abdominal segments with latero-caudal angles weakly produced caudad.

Supra-anal plate feebly bilobate, subchitinous in male, heavily chitinous in female. Cerci moderately elongate in male, short and lamellate in female. Limbs showing decided atrophy of all spines, surfaces impresso-punctate, with ventro-cephalic and ventro-caudal margins of femora roughly carinate.

Ventro-cephalic margin of cephalic femora armed with (one to four) short, heavy, irregular spines, succeeded by an irregular row of very minute, short spines, terminated by a small but heavy, though plainly decidedly atrophied, spine; other ventral femoral margins unarmed, except rarely with a single heavy, though greatly atrophied, spine on the cephalic margin of the median or caudal femora. Dorsal genicular spines of median and caudal femora small but heavy, though greatly atrophied. Caudal metatarsus elongate, with two rows of spines ventrad and a row of more distantly placed spines on each side. Four proximal caudal tarsal joints supplied distad with moderately well developed pulvilli. Small arolia present in male, subobsolete in female.

[121] This type of wing is clearly a transition toward the types found in the Corydiinae and Polyphaginae.

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Hyporhicnoda reflexa (Saussure and Zehntner) (Plate V, figures 8 and 9.)

1893. *Rhicnoda reflexa* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 68, pl. iv, fig. 35. [juv.? ♂; Chontales, Nicaragua.]

It is evident from the figure that the type is an immature male.

Porto Bello, Panama, III, 14, 1911, (Busck), 1 ♀.

Gatun, Canal Zone, Pan., VI, 1915, (Harrower; under logs) 1 juv.? ♀; VII, 28 to VIII, 22, 1916, (Harrower; under logs), 5 ♀.

Rio Trinidad, Pan., VI, 3, 1912, (Busck), 1 juv. ? ♀.

In addition we have a male from the Hebard Collection, taken at Ujurrás de Térraba, head of Rio Ceibo, Costa Rica, 7000 to 8000 feet, September 10, 1907, by M. A. Carriker Jr., which has enabled us to diagnose this remarkable genus for both sexes. The measurements for this individual are: length of body, 21; length of pronotum, 5.9; width of pronotum, 9.2; length of tegmen, 21.9; width of tegmen, 8.2; length of anterior field of wing, 20; greatest length of radial field of wing, 15.1; length of caudal tibia, 7.7 mm.

For the unquestionably adult females the measurements are: length of body, 25.1 to 26.4; length of pronotum, 7.8 to 8.6; width of pronotum, 12 to 13.3; length of caudal tibia, 6.8 to 8 mm.

Both sexes are uniform brown in general coloration, the male lighter than the female.

Subfamily BLATTINAE

Lamproblatta albipalpus Hebard (Plate V, figures 10 to 12.)

1919. *Lamproblatta albipalpus* Hebard, Trans. Am. Ent. Soc., xl, p. 109, pl. xvii, figs. 7, 8 and 9. [♂, ♀; Cincinnati, Sierra Nevada de Santa Marta, Magdalena, Colombia; Venezuela; the present material.]

Gatun, Canal Zone, Panama, VII, 17 to VIII, 22, 1916, (Harrower), 2 ♂, 2 ♀, 1 large juv. ♀, 2 small juv.

Obispo Station, C. Z., Pan., VII, 6 to 11, 1871, (Steindachner), 1 ♂, 1 ♀, [Museum of Comparative Zoology].

Zone limit three miles west of Empire, C. Z., Pan., IX, 14, 1913, (Hebard; in rubbish under vines on edge of jungle), 1 ♂, 1 ♀.

Corozal, C. Z., Pan., XI, 13 and 17, 1913, (Hebard; under decayed banana stem lying in jungle), 1 ♂, 1 ♀, 3 juv. ♂, 6 juv. ♀.

Old Panama, Pan., XI, 13, 1913, (Hebard; under drift on edge of coral sand beach), 1 juv. ♀.

Tabogilla Island, Pan., II, 16, 1912, (Busck), 1 ♀, 2 juv. ♂, 2 juv. ♀.

Taboga Island, Pan., II, 23, 1912, (Busck), 1 juv. ♂.

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The present series of this small shining black species, having white palpi and entirely lacking tegmina and wings, has been fully treated with the original description.

Pelmatosilpha rotundata Scudder

1900. *Pelmatosilpha rotundata* Scudder, Proc. Davenport Acad. Nat. Sci., viii p. 93; pl. ii, fig. 5. [♂, Texas (*type*): ♀, Panama.]

Porto Bello Bay, Panama, (Jennings; in epiphytic Bromeliad), 1 ♂.

This large shining blackish roach, with large, convex and broadly rounded tegmina, has already been correctly recorded by Caudell.

Eurycotis biolleyi Rehn

1918. *Eurycotis biolleyi* Rehn, Trans. Am. Ent. Soc., xliv, p. 321, pl. xviii, figs. 1 to 4. [♂, ♀; ten Costa Rican localities.]

Boquete, Panama, III, 2, 1914, (Zetek), 1 ♀, [United States National Museum].

The present specimen is slightly larger than any of the originally treated females of this shining blackish brown species, which possesses lateral pad-like tegmina. A very decided amount of cephalic size variation is shown in this insect, the size of the head, however, increasing regularly with that of the body.

Measurements (in millimeters)

♀	Length of body	Greatest width of abdomen	Length of head	Width of head
Tablazo, Costa Rica, *allotype*	20.2	11.8	5.3	4.9
Itiquis, Costa Rica, *paratype*	24	12.1	5.9	5.4
Santa Maria de Dota, Costa Rica, *paratype*	26	12.8	6	5.6
La Palma, Costa Rica, *paratype*	27.8	13.1	7	6.4
Boquete, Panama	30.5	15	7.3	6.8

Eurycotis pluto new species (Plate V, figure 13.)

The present uniform shining blackish insect is the largest yet described species of the genus. It belongs to the group of relatively slender forms having lateral pad-like tegmina.

The species is very closely related to *E. biolleyi* Rehn, differing in its great size and relatively narrower form, the greatest abdominal width being contained distinctly over twice in the body length, approximately twice in *biolleyi*.

Relationship with the Brazilian *E. manni* Rehn also exists; comparison with the male type shows that species to be absolutely black, decidedly smaller, with caudal metatarsi proportionately very decidedly shorter.

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Type.— ♀ ; Porto Bello, Panama. March 2, 1911. (A. Busck.) [United States National Museum.]

Size extremely large; form elliptical, depressed, relatively slender for the genus. Surface polished. Head with occiput transversely evenly convex, interocular space very broad, slightly broader than width between antennal sockets; ocellar spots distinct; antennae elongate, not equal to body length. Maxillary palpi with fifth joint not strongly enlarged, subequal in length to fourth; fourth about three-quarters as long as third joint.

Pronotum of the usual form for the genus; surface smoothly convex, briefly and suddenly deflexed on either side of the head; caudal margin straight laterad, showing a very feeble broad convexity mesad. Mesonotum with caudal margin much as that of pronotum. Metanotum with latero-caudal angles slightly but appreciably produced, sharply rectangulate, the lateral portions of the caudal margin resultantly distinctly concave. Tegmina lateral, slightly surpassing the caudal margin of the mesonotum, length of exposed portion one and one-half times greatest width; costal margin very feebly convex, weakly cingulate, apex subrectangulate and rather sharply rounded; sutural and distal margins regularly convex, the angle formed by their juncture obtuse and broadly rounded. Wings absent.

Abdomen elongate, scarcely broader than thorax and with surface very slightly less convex; disto-dorsal abdominal segments with latero-caudal angles showing distinct but not pronounced acute projections directed caudad. Supra-anal plate partly deformed.[122] Cerci fusiform; dorsal surface flat, showing the sutures of the joints weakly; apex acute; ventral surface of (thirteen) joints strongly convex with lateral margins narrowly but strongly cingulate, this greater for the external margins.

Femora heavily spined as characteristic of the genus. Caudal tibiae elongate, flattened, slender, unspecialized. Caudal tarsi very elongate; metatarsus slender, approximating the combined length of the succeeding joints, ventral surface with two rows of widely spaced minute spines, terminating distad at the moderately large globose pulvillus; succeeding three joints with ventral surfaces fully occupied by large pulvilli. Decidedly small arolia present between the bases of the tarsal claws.

Dorsal surface shining blackish with a very slight brown tinge. Head the same color, ocellar spots ochraceous-buff; a small spot on either cheek, entire clypeus, jaws and ventral half of labrum chestnut. Antennae in brief proximal portion shining blackish with a very slight brown tinge, remaining portions dull bay. Underparts, coxae and proximal portions of femora chestnut, becoming blackish chestnut distad on abdomen and distal portions of limbs. Pulvilli ochraceous-buff.

Length of body, 49.2; length of head, 10.3; width of head, 9.2; width of interocular space, 5.9; length of pronotum, 13; width of pronotum, 19; exposed length of tegmen, 6.7; width of tegmen, 4.8; width across mesonotum and tegmina, 20.7;

[122] From the normal portion, apparently as in this sex of *biolleyi*.

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greatest width of abdomen, 21.6; length of caudal tibia, 17.7; ventral length of caudal metatarsus, 6 millimeters.

The type of this interesting species is unique.

Periplaneta americana (Linnaeus)

1758. [*Blatta*] *americana* Linnaeus, Syst. Nat., Ed. X, p. 424. [America.]
1917. *Periplaneta americana* Hebard, Mem. Am. Ent. Soc., 2, p. 178, pl. vii, figs. 3 to 11. (Detailed diagnosis.)

Gatun, Canal Zone, Panama, VII, 28 to VIII, 22, 1916, (Harrower), 3 ♂, 3 ♀, 1 juv.

Balboa, C. Z., Pan., VI, 8, 1916, (Harrower), 1 ♂.

This and the following three species are domiciliary insects, widely distributed through tropical America.

Periplaneta brunnea Burmeister

1838. *P[eriplaneta] brunnea* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 503. [♂, ♀; Chile; Demerara [= British Guiana].]
1896. *P[eriplaneta] truncata* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, ix, no. 236, p. 4. [♂, ♀; Rio Lara, Darien.]
1917. *Periplaneta brunnea* Hebard, Mem. Am. Ent. Soc., 2, p. 182, pl. vii, figs. 12 to 16. (Detailed diagnosis.)

Porto Bello, Panama, III, 18, 1911, (Busck), 1 ♂.

Gatun, Canal Zone, Pan., VIII, 6 to 22, 1916, (Harrower), 5 ♂.

Periplaneta australasiae (Fabricius)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et regionibus incognitis revertente."]
1917. *Periplaneta australasiae* Hebard, Mem. Am. Ent. Soc., 2, p. 185, pl. vii, figs. 17 to 19. (Detailed diagnosis.)

Gatun, Canal Zone, Panama, VII, 28 to VIII, 22, 1916, (Harrower), 1 ♂, 1 ♀, 2 juv.

Rio Trinidad, Pan., VI, 6, 1912, (Busck), 1 ♂.

Argas, Pan., IV, 28, 1911, (Busck), 2 juv.

Subfamily PANCHLORINAE

Pycnoscelus surinamensis (Linnaeus)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, p. 687. [Surinam.]
1917. *Pycnoscelus surinamensis* Hebard, Mem. Am. Ent. Soc., 2, p. 193, pl. viii, fig. 1. (Detailed diagnosis.)

Canal Zone, Panama, 1907, (Busck), 1 ♀.

This is a circumtropical species, widely distributed throughout tropical America.

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Pycnosceloides aporus Hebard (Plate V, figure 14.)

1919. *Pycnosceloides aporus* Hebard, Trans. Am. Ent. Soc., xlv, p. 300, figs. 1 and 2. [♀, juv.: Brownsville, Texas; Monte Diablo, California; Orizaba, Motzorongo and Minatitlan, Vera Cruz, Mexico; material here recorded.]

Porto Bello, Panama, II, 18 and 24, 1911, (Busck), 1 ♀, 2 juv. ♀.
Alhajuela, Pan., IV, 4 to 17, 1911, (Busck), 2 juv. ♂, 5 juv. ♀.
Rio Chilibre, Pan., IV, 14, 1911, (Busck), 1 juv. ♀.
Rio Trinidad, Pan., V, 4, 1911, (Busck), 2 juv. ♂, 1 juv. ♀.
Cabima, Pan., V, 22 and 24, 1911, (Busck), 2 juv. ♂, 6 juv. ♀.
Corozal, Canal Zone, Pan., XI, 17, 1913, (Hebard; in jungle under decaying banana stem in which were boring individuals of *Litopeltis bispinosa* (Saussure)), 2 juv. ♀.

This remarkable genus and species which, at least in the adult females, appears to retain the immature form in full, has recently been fully discussed with the original description. This retention of immature form is a feature hitherto unknown in the Panchlorinae, unless, as there stated, it sometimes occurs in *Pycnoscelus surinamensis* Linnaeus).

Close resemblance is shown to individuals of the latter species lacking organs of flight. The present species is distinguished by the distal abdominal segments being similarly roughened, but not to a like degree, and in consequence not as sharply and decidedly in contrast with the remaining polished dorsal surface, while the caudal margins of these segments are more strongly beaded. The limbs are shorter, the ventro-cephalic margin of the cephalic femora with a fringe of hairs, which does not increase considerably in length proximad, while all the ventral femoral margins are without spines, even distad, except the caudal margin of the caudal femora, which bears mesad a single small spine, rarely with another smaller proximal spine. The dorsal genicular spine of the median and caudal femora is slighter. The tarsal claws are more elongate and slender, with a smaller arolium between. The coloration is very similar, blackish brown with a chestnut tinge above, much paler below, with occiput and ocellar areas paler than face.

The discovery of the adult male of this species is awaited with interest.

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Panchlora cubensis Saussure

1862. *P[anchlora] cubensis* Saussure, Rév. et Mag. de Zool., (2), xiv, p. 230. [♀, Cuba.]

1896. *P[anchlora] viridis* Griffini (not *Blatta viridis* Fabricius, 1775), Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 4. [♂, ♀; Punta di Sabana and Ciman, Darien.]

1917. *Panchlora cubensis* Hebard, Mem. Am. Ent. Soc., 2, p. 198, pl. viii, figs. 2 to 5. (Detailed diagnosis.)

Pinogana, Darien, Panama, XII, 1915, (Muñoz), 1 ♂, [Hebard Collection].
Porto Bello, Pan., II, 15 to III, 16, 1911, (Busck, Jennings), 7 ♂, 5 ♀.
Caldera Island, Porto Bello, Pan., (Jennings), 7 ♂.
Gatun, Canal Zone, Pan., VII, 28 to VIII, 22, 1916, (Harrower), 2 ♀.
Alhajuela, Pan., IV, 17, 1911, (Busck), 1 ♀.
Limon Plantation, Chagres River, Pan., VII, 14, 1918, (Dietz and Zetek), 1 ♀.
Rio Trinidad, Pan., III, 19, 1912, (Busck), 1 ♀.
Tabernilla, C. Z., Pan., V, 4 to VI, 14, 1907, (Busck), 3 ♂, 1 ♀.
Paraiso, C. Z., Pan., I, 18 to II, 3, 1911, (Busck, Schwarz), 2 ♀.
Cabima, Pan., V, 17, 1911, (Busck), 1 ♀.
Corozal, C. Z., Pan., IV, 7, 1911, (Busck, at light), 1 ♂.
Ancon, C. Z., Pan., (Jennings), 1 ♀.
Tabogilla Island, Pan., II, 21, 1912, (Busck), 1 ♀.
Taboga Island, Pan., II, 20 to VI, 14, 1911 and 1912, (Busck), 3 ♂, 2 ♀.

Very great size variation is shown by the present series of this common and widely distributed delicate green roach. The extremes of the series are given below.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Pinogana	11.2	3.8	4.5	13	3.9
Porto Bello	10.8	3.7	4.1	12	3.7
Porto Bello	14	4.4	5.1	16	4.7
Tabernilla	12.2	4	4.9	13.7	4
Corozal	10.7	3.7	4.1	12.7	3.8
♀					
Porto Bello	16.4	5.1	6	18.5	5.7
Porto Bello	18.3	5.6	6.9	19.6	6.3
Porto Bello	19.5	6	7.4	20.8	6.8
Gatun	17	5.2	6.2	18.8	5.6
Gatun	20.8	6	7.1	21	6.2
Tabernilla	18.5	5.8	6.8	19.9	5.9
Paraiso	15.5	4.9	5.8	17	4.9
Paraiso	19.5	5.4	6.6	19.1	5.4

Every specimen in the series has a single black dot meso-distad on the tegmina. Only one specimen, the largest female from Porto

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Bello, has an additional minute black dot in the discoidal field meso-proximad.

The males have the eyes varying from subattingent to actually attingent. The females have the interocular space varying from slightly over one-third to slightly less than one-fourth the greatest ocular depth, excepting one individual in which the interocular space is distinctly narrower.

Panchlora exoleta Burmeister

1838. *P[anchlora] exoleta* Burmeister, Handb. Ent., ii, abth. ii, part 1, p. 507. [Pará and Bahia, Brazil.]

1893. *Panchlora punctum* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 96. [♀; Central America.]

Chiriqui, Panama, 1 ♀, [Hebard Collection].

From the three line description of *punctum*, we are led to believe that this name is based on the large condition of *exoleta* here discussed, which is found in northwestern South America and in Central America. The interocular width is described as almost greater than that of the eye in the type of *punctum*. This is considerably greater than in any female here discussed, but a feature of decided variability in the present species and also known to be exceedingly variable in the closely related *P. cubensis* Saussure.

From *cubensis*, males of *exoleta* are separable by the somewhat more depressed inter-ocular-ocellar area,[123] the stronger distal obtuse-angulate emargination of the supra-anal plate, longer cerci, and styles which are very minute, one-fifth to less than one-sixth as long as the cerci (in *cubensis* one-third to about one-fourth as long as the cerci). As has been noted, females are separable solely by their average decidedly larger size. The margins of the pronotum and marginal fields of the tegmina are often slightly more opaque, but this feature is not strikingly developed, shows some individual variation and is on the whole of little value.[124]

Though males of *exoleta* from eastern Peru, Brazil and Argentina, show but little greater size development than is usual in *cubensis*, and females are only above the average, not above the maximum, for that species, a male at hand from Alpayacu, Oriente, Ecuador, and a large series of males from Bogotá and Villavicensio, Cundi-

[123] This feature is not constant. It is distinctly apparent only in some series.

[124] It is further to be noted that, in alcoholic material, this condition is decidedly intensified.

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namarca, Colombia, are as large as females of *cubensis*, while the Panamanian female here recorded, one from Yuto, Jujuy, Argentina and a large series of this sex from the Colombian localities mentioned above, are very decidedly larger than any female of *cubensis* in the very large series of that species before us.

It is therefore evident that in northwestern South America and in Central America alone, *exoleta* is of very decidedly greater size than *cubensis*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Bogotá, Colombia (5)	14.9–16.1	4.9–5.4	5.9–6.4	17.9–20	5.4–6.1
Villavicensio, Colombia (32)	15.1–17.8	4.8–5.3	5.7–6.4	17.9–20	5.3–5.9
Alpayacu, eastern Ecuador	17	5.2	6.3	20.2	6.2
Cantumayo, eastern Peru (4)	13.3–15.5	4.3–4.9	4.9–5.6	15.1–16.8	4.8–5.4
Marmoré Railroad, Brazil[125]	13.8	4.4	5.2	15.7	4.9
Igarapé-Assú, Brazil[126] (2)	14–13.8	4.1–4.6	4.8–5.1	15–15.4	4.2–4.8
Yuto, Jujuy, Argentina[127]	12.2	4.2	4.9	15.4	4.2
♀					
Chiriqui, Panama	24	6.4	7.9	24.4	7.2
Bogotá, Colombia	23	6.8	8	25.3	8.1
Villavicensio, Colombia (19)	19.8–24.2	6.2–7.3	7.7–9.2	23.7–26.8	7–8.5
Cantumayo, eastern Peru (2)	17.9–20	5.5–6.1	6.8–7.9	20–22	5.9–7
Igarapé-Assú, Brazil	23	6	7	21.2	6.2
Yuto, Jujuy, Argentina	23.1	6.8	8	22.3	7

Panchlora colombiae Hebard

1919. *Panchlora colombiae* Hebard, Trans. Am. Ent. Soc., xlv, p. 115, pl. xviii, fig. 3. [♂, ♀; La Cumbre and Cauca, Colombia.]

Porto Bello, Panama, II, 28, 1911 and IV, 21, 1912, (Busck), 2 ♂.
Rio Trinidad, Pan., III, 23, 1912, (Busck), 1 ♂.

This is the only plain green species of the genus known from

[125] Correctly recorded by Rehn, Trans. Am. Ent. Soc., xlii, p. 239, (1916).

[126] Correctly recorded by Rehn, Proc. Acad. Nat. Sci. Phila., 1918, p. 161, (1918).

[127] This we believe to be the only correct record for this species from Argentina, as Rehn's record of *exoleta* from the Misiones is based on material of other species.

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Central America, which has the male subgenital plate strongly asymmetrical, produced sinistrad.

The specimens here recorded are smaller and have less elongate tegmina than the males originally described, while the eyes are more approximate, subattingent in two, attingent in one individual.

When compared with males of *P. cubensis* Saussure, these individuals are seen to be slightly broader with surface more shining, much as in *P. minor* Saussure and Zehntner.

Panchlora minor Saussure and Zehntner (Plate V, figure 15.)

1893. *Panchlora acolhua*[128] variety *minor* Saussure and Zehntner, Biol. Cent.-Am., Orth. i, p. 95. [♀; Bugaba, Panama.]

1893. *Panchlora fraterna* Saussure and Zehntner, Biol. Cent.-Am. Orth., i, p. 97. [♂, ♀; Chontales, Nicaragua; Volcan de Chiriqui, Panama.]

Rio Trinidad, Panama, V, 3, 1911, (Busck), 2 ♀.

Tabernilla, Canal Zone, Pan., V, 4, 1907, (Busck), 1 ♂.

This is a plain green species of the genus, having a blackish mesodistal antennal annulus. The male genitalia were not originally described, and we have thought it best to figure them for this reason.

The two females at hand have the interocular space showing marked difference; in one equalling one-fourth the ocular width, in the other over half the ocular width. In this sex the median portion of the free margin of the subgenital plate is transverse, normally showing no concavity whatever.

The dark antennal annulus occupies one to three joints in the present series.[129]

Panchlora translucida Kirby

1862. *Panchlora hyalina* Saussure (not *Blatta hyalina* Stoll, 1813), Rév. et Mag. de Zool., (2), xiv, p. 231. [[♀]; Guatemala.]

1893. *Panchlora hyalina* Saussure and Zehntner (not *Blatta hyalina* Stoll, 1813), Biol. Cent.-Am., Orth., i, p. 96. [♂, Cuba: ♀, Guatemala.]

1903. *Panchlora translucida* Kirby, Ann. Mag. Nat. Hist., (7), xii, p. 378. (New name.)

[128] We here select as type of *acolhua* the unique female, described from the State of Guerrero, Mexico. The specimens recorded as an unnamed variety of that species from Capetillo, Guatemala, are either small examples of *acolhua*, or large individuals of *minor*, while those described as *fraterna* are clearly the same as those described as *acolhua* variety *minor*.

[129] In other specimens of the species at hand it occupies seven to nine joints.

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Limon Plantation, Rio Chagres, Panama, VII, 14, 1918, (Dietz and Zetek; sweepings around corn field), 1 ♀, [United States National Museum].

This species is closely related to *P. minor* Saussure and Zehntner, agreeing in shining coloration and annulate antennae. It differs in the female sex in the larger size, slightly broader form, greater interocular space, which fully equals the ocular width, and in the median portion of the free margin of the subgenital plate, which is not straight transverse, but shows a weak and broad concavity, as much as that at the cercal bases.

The dark antennal annulus occupies four and six joints in this specimen.

Phortioeca phoraspoides (Walker) (Plate VI, figure 1.)

1871. *Zetobora phoraspoides* Walker, Cat. Derm. Saltat. Brit. Mus., v, Suppl. Blatt., p. 8. [♂; Chontales, Nicaragua.]

1893. *Zetobora sublobata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 102. [♂; Pantaleon, Guatemala.]

Cabima, Panama, V, 22, 1911, (Busck), 1 ♂, 2 ♀, 14 juv. in 3 instars.

This roach, though handsome in the adult winged condition, with pronotum black, ochraceous-buff meso-cephalad and ferruginous latero-cephalad, is even more striking in the immature stages (see plate VI, fig. 1). Then individuals are ochraceous-buff to ochraceous-tawny, showing a beautiful, intricate and symmetrical heavy pattern of black. In the immature stages only, this species is strongly patelliform.[130]

This species has also been recorded from San Carlos, Costa Rica.

CAPUCINELLA new genus

This genus is closely related to *Capucina* Saussure, agreeing in general character of structure, but differing in the smaller size, head with face flat but not concave, very delicate but not at all coriaceous pronotum and shorter distal tarsal joint, with arolium proportionately more ample.

Furthermore the sexes of the present genus are very different in general appearance. The male has the organs of flight fully developed, more so than in *Capucina*, the pronotum somewhat less

[130] We use this term to characterize the type of roach which is flattened, weakly convex above and concave beneath. Such structure enables the individual to press itself closely under bark or debris and doubtless when approached to retract head, antennae and limbs, leaving exposed only the protected dorsal surface. A genus of limpets bears the name *Patella*.

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transverse, and the tegmina very delicate and not at all coriaceous, with venation less crowded.

The female entirely lacks organs of flight and agrees with nymphal material of the genus *Capucina* in having all of the dorsal segments produced laterad, this in proportion to the production of the pronotum cephalad, but narrowing caudad, and there in like proportion to the production of the supra-anal plate.

Thus in *Capucinella*, unlike in *Capucina*, the remarkable patelliform[131] type of the immature condition is retained in adults of the female sex.

GENOTYPE: *Capucinella delicatula* new species.

Generic Description.—Male. Head very small, interocular space very narrow, entire face flat. Antennae delicate, decidedly shorter than body, first joint very elongate, cylindrical. Maxillary palpi very short. Pronotum extending beyond head a distance nearly equal to the cephalic length, structure extremely delicate; surface feebly and finely vermiculate-cribrose without minute nodules, cucullate above head, not reflexed, meso-laterad broadly and distinctly depressed, concave; cephalic and caudal margins very feebly cingulate, equally rather strongly convex to lateral angles, which are at a point mesad between the cephalic and caudal extremities, these angles very slightly less than rectangulate and very sharply rounded. Tegmina very delicate, broad, extending beyond apex of abdomen a greater distance than in *Capucina*, with apex broadly rounded; delicate veins in anal and discoidal fields rather widely spaced and connected by numerous transverse veinlets. Wings very delicate, intercalated triangle absent. Abdomen broad, lateral margins of dorsal segments dilated, latero-caudal angles rounded, but little produced caudad. Genitalia characteristic of the Panchlorinae.

Female. Head broader than in male but in general similar, except that the eyes are strongly reduced and are resultantly separated by a very wide space, while the antennae are much shorter. The pronotum is delicate, but not as extremely delicate as in the male

[131] This term is used to characterize the type of roach which is flattened, weakly convex above and concave beneath. The name is derived from that of the genus of limpets called *Patella*.

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and has the caudal margin less convex, the pronotum being resultantly more transverse, with lateral angles distinctly caudad of a median point between the cephalic and caudal extremities. Tegmina and wings absent. Form strongly patelliform, with lateral margins of all the dorsal segments decidedly more produced than in the male. Subgenital plate simple.

Both sexes with limbs slender, but not elongate. Cephalic femora with ventro-cephalic margin armed distad with a row of minute chaetiform spines, terminated by a single minute but stout distal spine; other ventral femoral margins unarmed. Median and caudal femora with a minute but stout dorsal genicular spine. Cephalic tibiae moderately elongate; all tibiae armed with small spines. Tarsi very short, proximal four joints with ventral surfaces fully occupied by large pulvilli, except proximal portion of metatarsus. Large arolia present between tarsal claws.

Capucinella delicatula new species (Plate VI, figures 2 and 3.)

This species is very distinctive. From a purely superficial standpoint, the male resembles more closely males of *Homalopteryx laminata* Brunner, than any other species at hand.

Type.— ♀ ; San Lorenzo, Sierra Nevada de Santa Marta, Magdalena, Colombia. Elevation, 7000 to 8300 feet. August 23, 1913. (M. A. Carriker Jr.) [Hebard Collection, Type no. 516.]

Size small, but larger than male. Form broad. Eyes strongly reduced, separated by a very wide space, equalling four times the narrow occipital ocular width. Maxillary palpi very short, fifth joint equal in length to third, slightly longer than fourth joint. Antennae not three times as long as head; first joint elongate cylindrical, narrowing in proximal third, four times as long as greatest width; second joint slightly narrower, slightly longer than wide; third joint distinctly narrower, twice as long as wide; succeeding joints grading from shorter than wide to over twice as long as wide distad. Tegmina and wings absent.

Dorsal surface with a medio-longitudinal line which develops into a very fine and weak carina in the cucullate portion of the pronotum. Mesonotum, metanotum and dorsal abdominal segments with latero-caudal angles slightly produced latero-caudad and distinctly less than rectangulate, sixth dorsal abdominal segment and supra-anal plate produced as far as the cercal apices. Cerci very small, lateral margins entire, dorsal surface deplanate, ventral surface strongly convex proximad, thence weakly convex in median portion distad. Supra-anal plate about one and three-fifths times wider than long, lateral margins straight and moderately diverging beyond cercal bases to broadly rounded latero-caudal angles, caudal margin straight,

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transverse. Subgenital plate simple, truncate meso-distad, reaching scarcely beyond cercal bases, margin slightly concave beneath cercal bases. Limbs, armament and other features given in generic description.

Allotype.—♂; Porto Bello, Panama. March 10, 1911. (E. A. Schwarz.) [United States National Museum.]

Size small, form moderately broad. Eyes large, subattingent. Maxillary palpi with fourth and fifth joints subequal in length, each slightly shorter than third. Antennae much more elongate than in female, but with joints very similar except that the distal joints grade to three times as long as wide. Caudal margin of pronotum showing weak convexities on each side above the humeral trunk of the tegmina. Tegmina extending beyond apex of abdomen a distance equal to the tegminal width; marginal field occupied by an irregular network of very fine veinlets; discoidal field with (eight) moderately radiating discoidal sectors; anal sulcus curving sharply distad toward sutural margin. Wings with (six) incomplete and (three) complete branches of the ulnar vein.

Dorsal surface of the abdomen with third, fourth and fifth segments each showing along delicate transverse ridge proximad; latero-caudal angles of segments not produced, rectangulate, with apices rather broadly rounded, except those of seventh segment which are weakly produced, subrectangulate with apex rather sharply rounded, eighth segment concealed. Supra-anal plate exceedingly delicate, produced, nearly twice as broad as long; caudal margin almost transverse, very feebly convex; latero-caudal angles very broadly rounded. Cerci short, delicate, not extending as far as caudal margin of supra-anal plate. Subgenital plate roundly produced sinistrad a distance slightly over half that of supra-anal plate, forming dextrad a large and weakly obtuse-angulate emargination, from the apex of which springs a slender, straight style, three-quarters as long as the adjacent cercus, with apex furnished with a few minute hairs.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tarsal joint
Porto Bello, Panama, *allotype*.....	13.5	4.9	7.2	14.2	5.7	1.1
♀						
San Lorenzo, Colombia, *type*.....	16.5	4.9	8.3	—	—	1
From Colombia, adventive at New York.....	14.2	4.7	8.1	—	—	1

Pronotum transparent, hyaline with a faint buffy tinge, except for the meso-caudal area, which, in a rather broad, inverted V-shaped space with lateral margins concave, is russet, showing microscopic scattered flecks of buff. Tegmina and wings transparent, hyaline with a faint buffy tinge, the tegmina in a few minute

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flecks and patches washed with cinnamon brown.[122] Remaining portions of dorsal surface light ochraceous-buff, washed with russet toward the tegminal and wing bases on mesonotum and metanotum and shading to ochraceous-buff meso-distad on abdomen. Head, ventral surface and limbs ochraceous-buff, this slightly deeper on femora. Eyes blackish mummy brown. Antennae ochraceous-buff proximad, shading to mummy brown in remaining portions (over two-thirds), except terminal joint which is ochraceous-buff. Cephalic tibiae with a minute fleck of prout's brown proximad on cephalic face, so that this is concealed by the slightly produced and rounded genicular lobe of the cephalic femora when the limbs are flexed.

Female. Buffy in general coloration, the dorsal surface covered with a microscopic network of a cinnamon brown incrustation. Underparts lighter buffy. Head with a weak, irregular, mottled and rather narrow interocular band of prout's brown, and a blackish interocellar band, this latter continued briefly beneath each of these points. Antennae more sharply mummy brown mesad than in male, with (three to five) distal joints pale buff. Cerci with a heavy band of blackish brown occupying their median half.

In the adventive specimens, here recorded, the interocellar band sends a median suffusion ventrad to the labrum, the face thus bearing a heavy, blackish, roughly T-shaped marking.

In addition to the type and allotype, the following material is before us.

San Lorenzo, Sierra Nevada de Santa Marta, Magdalena, Colombia, VIII, 23, 1913, (M. A. Carriker, Jr.), 1 juv., 3 small juv., taken with type, [Hebard Collection].

At quarantine, New York, received in orchids imported from Bogotá, Columbia, V, 1915, (H. B. Shaw), 2 ♀, [United States National Museum].

Subfamily BLABERINAE

Archimandrita tessellata Rehn

1903. *Archimandrita tessellata* Rehn, Trans. Am. Ent. Soc., xxix, p. 287. [♂; San Carlos, Costa Rica.]

Panama, (Harrower), 1 ♂.
Colon, Pan., V, 1913, (Zetek), 1 ♂, [Hebard Collection].
Tabernilla, Canal Zone, Pan., I, 1907, (Busck), 1 ♂.
Gorgona, C. Z., Pan., (Jennings), 1 ♂.

The present species is the largest and has the broadest tegmina of the Central American Blaberinae. This and the tessellate tegmina readily distinguish the species from any of the forms of the genus *Blaberus*.

[122] This may be due to the specimen being slightly soiled, rather than to its pigmentation. We would note that whereas our series of *Capucina patula* (Walker), from Costa Rica, all show an incrustation to varying degrees on pronotum and tegmina, none have these portions covered by "velvety pile", as described for the synonymous *cucullata* by Saussure and Zehntner (Biol. Cent. Amer., Orth., i, p. 103, (1893)).

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This insect was described as smaller than *A. marmorata* (Stoll). From careful consideration of the literature, the type, and a series of twenty-one Central American examples of the genus at hand, we have reached the following conclusions.

Stoll's *marmorata*[133] is an insect averaging distinctly smaller in size than *tessellata*, but having the interocular space decidedly wider. It is represented by material before us from Nicaragua only, and *tessellata* may prove to be a large southern race of that species. The material recorded by Rehn as *marmorata* from Colombia, represents instead *tessellata*, which we believe is also the case for all other material previously recorded from Costa Rica southward. Rehn was unacquainted with true *marmorata* at the time of the description of *tessellata*.

To show the exact differences from which we feel justified in holding *tessellata* as a valid species, we give the following measurements (in millimeters).

♂	Width of interocular space	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
marmorata					
San Marcos, Nicaragua	1.7	14	21.8	50	22.3
tessellata					
Tarbaca, Costa Rica	1.1	15.3	23.4	59.5	24.4
San Carlos, Costa Rica	1	16.1	26.2	62.8	26.8
Gorgona, Panama	1	16.6	25.2	68.3	27.9
Colon, Panama	1.2	17.2	28	70	29.9
♀					
marmorata					
Nicaragua	2	14.1	22.1	42	21.7
Nicaragua	2	13.9	22.3	41.8	21.3
tessellata					
Monte Redondo, Costa Rica	1.2	17	26.8	54.8	25.8
Costa Rica	1.3	17.9	27.7	57.9	27
Colombia	1.3	18.2	28.3	62	30.6

The present species shows decided size variation and also frequent pronotal asymmetry.

[133] Bruner has recorded that species from the island of Ometépe, Nicaragua, and has given an excellent figure of the insect (Nat. Hist. Bull., Lab. Nat. Hist. State Univ. Iowa, iii, p. 60, pl. ii, fig. 1, (1895)).

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Blaberus colosseus (Illiger)

1802. *Blatta colossea* Illiger, Mag. Insektenkunde, i, p. 186. [Demerara (= British Guiana).]

1916. *Blaberus colosseus* Hebard, Ent. News, xxvii, p. 291, pl. xv, figs. 2 to 5. [♂, ♀; localities in Mexico, Guatemala, Costa Rica, Panama, Venezuela, Trinidad and French Guiana.]

Alhajuela, Panama, III, 10, 1912, (Busck), 1 ♂, 1 ♀, 1 small juv.
Gorgona, Canal Zone, Pan., 1 ♂, [Academy of Natural Sciences of Philadelphia].
Paraiso, C. Z., Pan., IV, 4, 1912, (Busck), 1 juv. ♂, 1 small juv.
Cabima, Pan., V, 18, 1911, (Busck), 1 ♂, 1 ♀ with ootheca.
Ancon, C. Z., Pan., 1 ♂, [United States National Museum].
Chorrera, Pan., V, 17, 1912, (Busck), 1 ♀.
Bugaba, Chiriqui, Panama, (Wm. Schaus), 1 juv. ♂.

This is the largest Central American species of the genus, the tegmina in females of the present series measure sixty-six to seventy millimeters in length. The insect is a beautiful immaculate pale buffy brown, with shield-shaped area on disk of pronotum, humeral trunk and a broad transverse band mesad between the humeral veins of the tegmina when these are at rest, dark brown.

The ootheca is simply a mantle, holding a double row of eggs in place in a strip, in the specimen before us eight millimeters in width and extruded a distance of approximately twenty-four millimeters.

The immature condition of this species is distinctly patelliform (see footnote 130, on page 109), with pronotum and lateral portions of abdominal segments exceedingly lamellate, when compared with immature examples of other species of the genus *Blaberus*.

Blaberus discoidalis Serville

1839. *Blabera discoidalis* Serville, Hist. Nat. Ins., Orth., p. 76. [♀, San Domingo.]

1889. *Blabera limbata* Bruner (not of Burmeister, 1838), Proc. U. S. Nat. Mus., xii, p. 188. [adult, Panama.]

1896. *B[labera] trapezoidea* Griffini (not of Burmeister, 1838), Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 4. [♀; Punta di Sabana, Darien.]

1896. *B[labera] rufescens* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 4. [♀; Lake Pita, Darien.]

1916. *Blaberus discoidalis* Hebard, Ent. News, xxvii, p. 294. [Detailed diagnosis: ♂, ♀: San Domingo, Porto Rico, Jamaica, Trinidad, Venezuela and Panama.]

Pinogana, Darien, Panama, XII, 1915, (Muñoz), 1 ♀, 1 juv. ♂, [Hebard Collection].

Porto Bello, Pan., (Jennings), 1 ♂.

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Rio Trinidad, Pan., VI, 4, 1912, (Busck), 1 juv. ♂, 1 juv. ♀.

Gatun, Canal Zone, Pan., VII, 28 to VIII, 22, 1916, (Harrower; near habitations, under boards), 2 juv. ♂, 3 juv. ♀, 1 small juv.

Ancon, C. Z., Pan., (Jennings), 22 small juv.

Taboga Island, Pan., VI, 4, 1912, (Busck), 1 juv. ♀.

This species is readily distinguished from the preceding by its decidedly smaller size, somewhat broader form and darker buffy brown general coloration. The tegmina are seldom much suffused beyond the apex of the humeral trunk, though sometimes heavily so, but a broad transverse median band, such as is found in *colosseus*, never occurs.

The immature condition of this species is more convex and has the pronotum and lateral portions of the dorsal surface much less lamellate than in immatures of *colosseus*, in general form very similar to immature examples of the genus *Archimandrita*.

EUBLABERUS new genus

1894. *Blabera* Saussure and Zehntner, Biol. Cent. Am., Orth., i, p. 117. (In part; species placed in section "*a*" of key for the genus.)

The present genus includes *biolleyi* (Rehn), *posticus* (Erichson), *sulzeri* (Guerin), *distanti* (Kirby), *femorata* (Scudder) and *immacula* (Saussure and Zehntner), which, in our opinion should be arranged in the order here indicated.

GENOTYPE: *Eublaberus biolleyi* [*Blaberus biolleyi*] (Rehn).[134]

The genus is closely related to *Blaberus*, but differs signally in a number of features, given in the following description, which give all of the species a distinctly different facies.

Generic Description.—Interocular space wide to very wide; wide only in certain species of *Blaberus*. Antennae heavy, incrassate, moderately pilose except in proximal portion; distinctly more slender in *Blaberus*, with pilose condition less decided. Pronotum with lateral margins showing an appreciable angulation mesad or meso-cephalad, or with point of greatest convexity meso-cephalad; in *Blaberus* the lateral margins of the pronotum never show any angulation, the point of greatest convexity being mesad or meso-caudad. Pronotum with a broad blackish bar on caudal margin.[135]

[134] We select this species as genotype, owing to the fact that both original description and figure are better than for any other species here included. See Proc. Acad. Nat. Sci., 1905, p. 792, fig. 1, (1906).

[135] Such marking is found only in *Blaberus fraternus* Saussure, among the species of that genus at hand.

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Ventro-cephalic margin of cephalic femora supplied with a fringe of hairs, terminated by a single stout spine; occasional individuals show one or a few stout proximal spines on this margin; which is the normal condition in *Blaberus*. Ventro-caudal femoral margins supplied with hairs; ventro-caudal margin of cephalic and median femora armed, distad only, with two closely placed heavy spines;[136] in *Blaberus* these two distal spines are never found. Limbs proportionately somewhat shorter and stouter than in *Blaberus*.

Eublaberus biolleyi (Rehn)

1906. *Blaberus biolleyi* Rehn, Proc. Acad. Nat. Sci. Phila., 1905, p. 792, fig. 1. [♀; Reventazon River, plains of Santa Clara, Costa Rica.]

Cabima, Panama, V, 27, 1911, (Busck), 1 ♀.

The present specimen closely resembles the type. The pronotum is slightly more ample, the two pair of dots cephalad similar, the pair of median blotches and pair of caudal blotches narrowly fusing longitudinally with each other and with the broad caudal marginal black band. We would note that this marginal band is broadest mesad in the present species, narrowing toward the point above the humeral trunk of the tegmina on each side and very narrowly continued beyond. In *E. posticus* (Erichson) this band is nearly subequal in width throughout and is sharply obliquely terminated at the point above the humeral trunk of the tegmina on each side.

Eublaberus posticus (Erichson)

1848. *Blabera postica* Erichson, in Schomb. Reisen Brit. Guiana, iii, p. 580. [British Guiana.]

1894. *Blabera thoracica* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 120, pl. v, fig. 25. [♀: Panama; Bogotá, Colombia.]

1896. *B[labera] thoracica* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 5. [♀; Punta di Sabana, Darien.]

Panama, 1 ♀, [U. S. N. M.]

Gatun, Canal Zone, Pan., VII, 25 to VIII, 22, 1916, (Harrower; one in house), 2 ♀.

The present insect is distinctive in having, in the area of the lyrate pronotal escutcheon, a large number of small dark dots and blotches, rather than a few heavier markings, as found in *E. biolleyi* (Rehn), or a heavy suffusion such as occurs in the remaining species of the genus.

[136] Occasionally one or both of these spines are missing on one or more of these femora. Not a specimen at hand, however, fails to have at least two of the four femora supplied with these two distal spines, which occur in no other genus of the Blattidae known to us.

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Decided variation occurs in the width of the interocular space and in size, as is shown by the following measurements (in millimeters) for the few Panamanian specimens at hand.

♀	Interocular width	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Panama	2.9	12.8	17.7	44.9	16.6
Gatun, Panama	2.6	11.1	16.1	38.8	15.1
Gatun, Panama	2.3	11.1	16.1	37.4	14.5

Subfamily CORYDIINAE

Holocompsa nitidula (Fabricius)

1781. *B[latta] nitidula* Fabricius, Spec. Ins., i, p. 345. [[♀], Surinam.]

1917. *Holocompsa nitidula* Hebard, Mem. Am. Ent. Soc., 2, p. 206, pl. viii, figs. 8 to 11. (Detailed diagnosis.)

Ancon, Canal Zone, Panama, (Jennings), 1 ♂.

The male sex of this minute species has the pronotum black, with a weak green-blue sheen, the female having the pronotum mars yellow to orange rufous.

The present specimen is decidedly smaller than a series of other males of the species before us. Length of body, 4; length of pronotum, 1.2; width of pronotum, 1.8; length of tegmen, 3.9 mm. In other respects it shows no variation from the normal.[137]

Holocompsa panamae new species (Plate VI, figure 4.)

The present species has the tegmina immaculate, the pronotum pale laterad, dark mesad, the median band expanding caudad to the caudal margin, instead of narrowing and failing to reach the caudal margin as in *H. zapoteca* Saussure and Zehntner, which is the only other known species of the genus having the pronotum bicolored. In size *panamae* is smaller than any of the known species, the type female being smaller than the average male of *H. nitidula* (Fabricius).

Type.— ♀; Paraiso, Canal Zone, Panama. February 7, 1911. (A. Busck.) [United States National Museum.]

Size very small, form stout, tegmina and wings projecting only slightly beyond apex of abdomen. Head fully as broad as long; eyes very widely separated, above not extending inward beyond antennal bases; ocelli minute, oval, with surface convex; occiput and face supplied with very minute and moderately numerous hairs.

[137] We regret to state that, in the detailed diagnosis referred to above, we failed to mention that, in males of this species, the hyaline distal portion of the tegmina shows, when the tegmina are at rest, a weak but broad transverse suffusion of brown.

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Pronotum proportionately less ample and less transverse than in *nitidula;* well supplied with very minute hairs, these decidedly less numerous and not elongate on the cephalic and lateral margins as in *nitidula;* surface weakly convex, becoming strongly so laterad; cephalic and caudal margins transverse, lateral margins weakly divergent caudad and weakly convex; latero-cephalic angles very broadly rounded and very broadly obtuse-angulate, latero-caudal angles broadly rounded, forming an angle of slightly more than ninety degrees. Scutellum proportionately large, smooth, without hairs. Tegmina proximad opaque, smooth, without hairs, bounded by a straight oblique line from apex of scutellum to apex of discoidal vein; remaining distal portion delicate, suffused, hyaline.

Cerci as in *nitidula*, with (eight) strongly defined, rounded joints. Supra-anal plate decidedly produced, free margin rather strongly convex. Subgenital plate[138] with surface convex, deeply and sharply acute-angulate emarginate in mesal quarter, this area occupied by two valves, with surfaces weakly concave, separated by a medio-longitudinal cleft.

Cephalic femora with ventro-cephalic margin armed with a row of minute chaetiform spines, succeeded by two heavy, elongate, distal spines, of which the last is much the longer; other ventral femoral margins unarmed. Tarsi very slender; caudal metatarsus longer than combined length of succeeding joints, its ventral surface armed with a double row of microscopic chaetiform spines; minutely microscopic pulvilli appreciable only, situated distad on first and second joints, filling ventral surfaces of third and fourth joints. Moderately well developed arolia present.

Length of body, 5; length of pronotum, 1.4; width of pronotum, 1.7; length of tegmen, 4.65; width of tegmen, 1.8; length of caudal tibia, 1.8 mm.

Head blackish mummy brown. Antennae of same color, with a broad buffy annulus (which occupies four to six joints) meso-distad. Pronotum with a broad medio-longitudinal suffused band of blackish mummy brown, which expands evenly caudad, nearly twice as broad at the caudal margin as at the cephalic margin; pronotum laterad light ochraceous-buff, tinged with ochraceous-orange mesad toward the median band. Proximal opaque portion of tegmina blackish mummy brown, with a very feeble metallic purplish sheen; distal portions of tegmina hyaline, tinged with mummy brown. Ventral surface and limbs dark mummy brown, except proximal two-thirds of median and caudal femora, which are pale ochraceous-buff.

The type is unique.

Hypercompsa fieberi (Brunner)

1865. *Diaphana fieberi* Brunner, Nouv. Syst. Blatt., p. 439. [♂, Brazil.]

Porto Bello, Panama, II, 24, 1911, (Busck), 1 ♀.

This diminutive insect is remarkable in having the tegmina entirely clear hyaline, except for a narrow marginal area which expands slightly twice along the costal margin and a very narrow

[138] The remaining portions of this description give characters which are found in all the species of the genus *Holocompsa*.

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marginal area bounding the sutural margin in the anal field, these areas opaque, blackish. The insect is blackish, with caudal margin of pronotum narrowly ochraceous-tawny, this expanding slightly toward the latero-caudal angles. The cerci and a broad meso-distal annulus on the antennae are ochraceous-buff.

Latindia dohrniana Saussure and Zehntner

1894. *Latindia dohrniana* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 111, pl. v, fig. 7. [♀, Guatemala.]

Rio Trinidad, Panama, V, 3, 1911, (Busck), 1 ♀.
Cabima, Pan., V, 24, 1911, (Busck), 1 ♀.

Both females here recorded have fully developed tegmina, extending well beyond the apex of the abdomen. A small series before us shows that tegminal reduction occurs in this species in both sexes, varying to the condition figured for the type, which shows the tegmina failing to reach the apex of the abdomen by almost the pronotal length.

The present minute brown species has the sexes similar; eyes very widely separated, the interocular width decidedly greater than that between the antennal sockets, eyes reduced and narrower in dorsal than in lateral portion; disk of pronotum flat, strongly truncate caudad, with a transverse broadly obtuse-angulate linear sulcus meso-cephalad, from the angle of which extends caudad a medio-longitudinal linear sulcus; tegmina with numerous, strongly oblique discoidal sectors, and cephalic and caudal femora of male enlarged, the cephalic femora with two large, heavy dentate projections on their ventro-caudal margins. In both sexes the ventro-cephalic margin of the cephalic femora is supplied with a fringe of microscopic hairs, of which all but the more proximal are very short. Both median and caudal femora are normally supplied with a minute and very delicate dorsal genicular spine.[139] Pulvilli and arolia absent. These features we consider of generic diagnostic value.

Compsodes cucullatus (Saussure and Zehntner)

1894. *Latindia cucullata* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 111, pl. v, fig. 9. [♂; San Geronimo, Guatemala.]

Corozal, Canal Zone, Panama, IV, 14, 1912, (Busck), 1 ♂.

[139] Two specimens, in the small series before us, have one limb showing no trace of this spine.

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This minute brown roach is the only species of the genus [140] in which the pronotum is produced cephalad, extending beyond the head.

MELESTORA Stål

1858. *Melestora* Stål, Kongl. Svenska Freg. Eugenies Resa, Zool., i, p. 311.

The present genus is distinctly closer to *Compsodes* Hebard than to *Latindia* Stål, as is shown by the large and fully developed eyes, form of pronotum and character of tegminal venation.

From *Compsodes* we would note that the males of *Melestora*[141] are best distinguished by the more slender form; wide interocular space;[142] pronotum lacking medio-longitudinal linear sulcation; tegmina with discoidal sectors very weakly oblique beyond apex of anal field, elsewhere longitudinal,[143] cross-veinlets very weak or subobsolete proximad and obsolete distad; subgenital plate strongly asymmetrical, and arolia though very small relatively well developed, extending from half as far toward to nearly to the apices of the tarsal claws.

Melestora micra new species (Plate VI, figure 5.)

The present minute, uniformly colored species, with *M. minutissima* Rehn, is readily distinguished from the three other previously known South American species of the genus by the much smaller size and slender form.

The very close relationship to *minutissima* is shown by the fact that the two species agree in every respect, except in genitalic features.

Type.— ♂; Paraiso, Canal Zone, Panama. May 10, 1911. (A. H. Jennings.) [United States National Museum.]

Size minute; form elongate ovate, depressed surface polished, regularly but not thickly clothed with silky pile.[144] Head visible cephalad of pronotum; occiput

[140] Described; Trans. Am. Ent. Soc., 2, p. 208, (1917).

[141] The female sex is unknown for *Melestora*. In *Latindia* females are generally similar to males, in *Compsodes* they lack organs of flight and retain the immature form.

[142] Not, however, accompanied by ocular reduction or as wide as in *Latindia*.

[143] Stål's figure for the genotype, *M. adspersipennis* Stål, shows these sectors moderately oblique, though termed longitudinal veins in his original description. This disparity is probably due to the discoidal sectors being in that species as characterized above, which condition is shown by the several other species of *Melestora* before us.

[144] On the pronotum and proximal portions of the tegmina, this pile has been rubbed off in the two specimens at hand. The sockets from which the hairs spring are, however, there clearly visible under high magnification.

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convex, interocular space broad, appreciably greater than that between the antennal sockets, subequal to occipital depth of the very large eyes. Surface of interocular area with regularly placed impressed pits, connected by fine radiating lines, this weakening to area above labrum, which is smooth and polished. Maxillary palpi with fifth (distal) joint enlarged, as long as combined length of second and third joints, third joint slightly longer than fourth.

Pronotum transverse, short elliptical; margins convex, the greatest convexity being at the weakly suggested latero-caudal angles; surface weakly convex laterad, lateral-caudal sulci of disk represented by broad and rather shallowly depressed areas diverging cephalad, the intervening section very feebly convex, with very weak transverse wrinkles and no trace of a medio-longitudinal sulcation. Tegmina coriaceous, lanceolate-elliptical; width greatest meso-distad; apex rather broadly rounded; costal margin finely nodulose cingulate from distal portion of marginal field to apex; anal field elongate pyriform, anal sulcus distinct; discoidal sectors (four or five) longitudinal, except immediately beyond apex of anal field where one or two are weakly oblique, connected by moderately well developed cross-veinlets, which form irregularly rectangulate interspaces, the majority of which are elongate, particularly distad.[145] Wings fully developed.

Supra-anal plate transverse, free margin broadly and evenly convex. Paired plate beneath supra-anal plate with sinistral portion slightly the heavier, supplied with a few stiff microscopic hairs. Subgenital plate highly asymmetrical: margin sinistrad sharply and strongly obliquely concave ventrad of cercus, this concavity rather extensively subchitinous at its base, forming a socket from which springs a minute, microscopic, simple style;[146] mesad the plate is produced in a lamella with disto-sinistral angle broadly rounded, while the disto-dextral angle is produced dextrad in a heavy arm, which at its apex is sharply curved back, thence forming a slender chitinous process lying along the dorsal margin of the produced portion, with apex aciculate; dextrad the margin is feebly convex, oblique produced to the median produced portion, from which it is separated by a straight sulcus, which is subchitinous, showing a weak inclination sinistrad, and runs to near the proximal third of the plate.

Cephalic femora missing. Median and caudal femora with ventral margins well supplied with spiniform hairs.[147] Dorsal genicular spines absent from all limbs. Caudal tarsus about four-fifths as long as caudal tibia; the metatarsus slightly longer than the combined length of the succeeding tarsal joints, pilose, with ventral

[145] The tegmina in the specimens here considered have lost most of the pilose covering shown by the type of *minutissima*, and the venation is consequently more readily observed. These species do not show any differences in tegminal venation which we would consider of specific diagnostic value.

[146] In the type of *minutissima*, a homologous, minute, microscopic, simple, sinistral style is found.

[147] This is not a condition which we would term "finely spined," as given for *minutissima* by Rehn, in which species the limbs are in every way similar. This type of limb we would unhesitatingly place in the unarmed category.

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surface unspined. Pulvilli absent. Arolia moderately large, extending to near apices of tarsal claws, as is true for *minutissima*.

Measurements (in millimeters)

♂	Length of body[148]	Length of pronotum[149]	Width of pronotum	Length of tegmen	Width of tegmen
Paraiso, *type*.....	4.4	1.2	1.7	5	1.8
Paraiso, *paratype*.....	4.8	1.2	1.7	5.2	1.8

The coloration shows no specific diagnostic features of difference from that of *minutissima*. General color mummy brown; mouthparts, limbs and underparts buckthorn brown, except abdomen distad which is mummy brown. Antennae mummy brown proximad, shading to buckthorn brown distad. Tegmina translucent, prout's brown. Cerci buckthorn brown tinged with tawny.

In addition to the type, a paratypic male bearing the same data, but taken May 3, 1911, by E. A. Schwarz, is at hand.

BUBOBLATTA[150] new genus

The present genus has both sexes showing fully developed and very broad organs of flight. It is very distinctive, but apparently nearest *Melestora* of the described genera; differing in the presence of ocelli, maxillary palpi with elongate third and fourth joints, very broad tegmina with decided ridges between all of the veins, excepting those of the anal field, and distinctive armament of the limbs.

The genus is monotypic. GENOTYPE: *Buboblatta armata* [*Latindia armata*] (Caudell).

Generic Description.—Size large when compared with the species of the related genera, form relatively broad, surface well supplied with stiff microscopic hairs. Head not entirely concealed from above by pronotum; interocular space somewhat flattened, the greatest convexity and projection being between the distinct but minute ocelli. Third and fourth joints of maxillary palpi elongate, decidedly longer than the fifth (distal) joint. Antennae much longer than body.

[148] The greater length of the type of *minutissima*, 6.2 mm., is entirely due to the fact that that specimen is somewhat pressed out.

[149] We find no noteworthy difference for *minutissima* in pronotal proportions, the pronotum in the type of that species being 1.3 by 1.8 mm., according to our measurement.

[150] From *Bubo*, the generic name of the Great Horned and Eagle Owls. In allusion to the mottled owl-like appearance of the species referred to this genus.

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Pronotum subdeplanate, except laterad where it is weakly deflexed, disk slightly impressed with broad and shallow latero-caudal sulci appreciable; cephalic margin almost transverse, caudal margin very weakly convex. Tegmina very broad, with decided ridges between all of the veins except those of the anal field, discoidal sectors longitudinal; anal sulcus distinct; oblique sulcus of dextral tegmen decided.

Male subgenital plate weakly asymmetrical. Female subgenital plate valvular, the valves vertical, with proximal sulcus transverse.

Cephalic femora with ventro-cephalic margin armed with (three) widely separated, moderately heavy spines, succeeded by a row of closely placed, microscopic, piliform spines, terminated by three moderately heavy spines, elongate in strongly increasing ratio distad. Ventro-caudal margin of cephalic femora armed with a single distal spine, other ventro-caudal femoral margins unarmed, but all supplied with well spaced, moderately elongate hairs. Ventro-cephalic margins of median and caudal femora supplied with small hairs and armed with (two and one distal) moderately heavy, elongate spines. Median and caudal femora armed with a moderately heavy, elongate, dorsal genicular spine. Caudal tarsi very elongate, nearly as long as caudal tibia. Caudal metatarsus decidedly longer than combined length of succeeding joints, pilose, with ventral surface unarmed. Pulvilli absent. Minute arolia present.

Buboblatta armata (Caudell) (Plate VI, figures 6 to 8.)

1914. *Latindia armata* Caudell, Insec. Inscit. Menst., ii, p. 80. [♂; Gatun, Canal Zone, Panama.]

Porto Bello, Panama, VIII, 18 to 22, 1916, (Harrower), 1 ♂, 1 ♀.

Gatun, Canal Zone, Pan., (Jennings; in bromeliad), 1 ♂, *type*; VII, 25 to 31, 1916, (Harrower), 1 ♂.

This insect is easily one of the most distinctive of the American Corydids hitherto described. It is brussels brown in general coloration, delicately mottled with mummy brown, with a fleck of this darker color mesad on each side at the caudal margin of the pronotum, one proximad in the anal field at the sutural margin of the tegmina, and a more conspicuous fleck of this color meso-proximad in the discoidal field of the tegmina. The antennae, which are much longer than the body, are mummy brown distad, ochraceous-buff with an orange tinge in the proximal third, except

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the first two joints which are blackish chestnut brown. The minute globose ocelli are yellowish.

The higherto unknown female differs from the male in the following features. Size larger, form broader, Head with interocular space distinctly broader, slightly greater than the proportionately greater space between the antennal sockets. Pronotum more ample. Tegmina reaching beyond the abdomen a distance about equal to one-third their length (in the male reaching beyond the abdomen a distance equal to half their length). Supra-anal plate very strongly transverse, length about one-eighth proximal width, free margin broadly convex laterad, broadly concave mesad. Subgenital plate valvular, valves vertical, each subrectangulate, with length slightly over half basal width, dorso-distal and ventro-distal angles broadly rounded and the free margins all very feebly convex, basal sulcus transverse, straight, but surface of plate at that point strongly convex.[151]

As the male genitalia were injured in the type, we would note the following features. Supra-anal plate very strongly transverse, length less than one-eighth basal width, free margin strongly oblique laterad, transverse in median section, the angles thus formed very broadly obtuse-angulate and rounded. Subgenital plate appreciably more produced dextrad than sinistrad, supplied with two simple, straight styles, which are about six times as long as wide mesad; free margin strongly oblique to sinistral style, thence less strongly oblique to before base of dextral style, there rounding broadly into the feebly oblique, straight dextral margin.

Subfamily OXYHALOINAE

Key to the known Panamanian species of Chorisoneura[152]

A. Size relatively large (length of tegmen, 10 mm. or more). (Occiput reddish brown, interocular area whitish with two pairs of dark brown dots. Median portion of male subgenital plate, between bases of styles, with an elongate process, armed at apex with two slender spiniform teeth, which curve toward each other.)
panamae new species

[151] This rather suggests the type normal for the Blattinae. In that subfamily, however, we know of no species in which the valves themselves are as highly specialized.

[152] This key is furnished merely as an aid in locating Panamanian material. The multitude of species and numerous difficult, though valuable, characters of specific diagnostic importance require a much more detailed study.

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AA. Size relatively small (length of tegmen, 8 mm. or less).

B. Occiput and interocular area plain.

C. Form Anaplectoid, tegmina narrow. Color very dark brown, area of costal veins of tegmina immaculate dark brown. Male subgenital plate produced sinistrad in a small rounded projection, median portion between bases of styles with a single very small recurved tooth.....**parishi** Rehn

CC. Form normal, Chorisoneuroid, tegmina moderately broad. Color dull ochraceous-orange; area of costal veins of tegmina dark brown, with clubbed portion whitish. Male subgenital plate not produced sinistrad, median portion between bases of styles unarmed.....**fuscipennis** new species

BB. Striking interocular markings present.

C. Pronotum not conspicuously marked. Tegmina with scapular field of moderate width. Wings with area of radial veins of same color as other portions.

D. Head with two narrow transverse whitish interocular bands, separated by a dark brown band of equal width. Male styles tapering distad to acute apex. Median portion of male subgenital plate, between bases of styles, with two minute decurved teeth at base of dextral style.

translucida (Saussure)

DD. Head with a single broad dark brown interocular band. Male styles of approximately equal width to truncate apex, which has a minute median projection. Median portion of male subgenital plate, between bases of styles, minutely triangularly produced, unarmed.....**cabimae** new species

CC. Pronotum conspicuously marked. Tegmina with scapular field very broad. Wings with area of radial veins of different color from other portions.

D. Head with two narrow transverse buffy interocular bands, separated by a pale brown band of same color as occiput and face. Pronotum with narrow whitish marginal bands cephalad and caudad of equal width, disk immaculate. Median portion of male subgenital plate, between bases of styles, with an elongate process armed with (six) slender spiniform teeth.

specilliger new species

DD. Head with a broad transverse cream-colored interocular band dorsad, separated from a narrow band of the same color by a narrow dark brown band; occiput brown; face with a large subquadrate blackish brown area. Pronotum with marginal bands of unequal width, the cephalic band the wider; disk with two pale yellowish areas meso-caudad...**gemmicula** new species

Chorisoneura parishi Rehn

1918. *Chorisoneura parishi* Rehn, Proc. Acad. Nat. Sci. Phila., 1918, p. 163, pl. i, figs. 19 to 21. [♂; Igarapé-Assú, Pará, Brazil.]

Gatun, Canal Zone, Panama, VI, 1915, (Harrower), 1 juv. ♂.

Rio Trinidad, Pan., V, 2 to VI, 3, 1911 and 1912, (Busck), 1 ♂, 2 ♀, 1 juv. ♀.

Tabernilla, C. Z., Pan., V, 1907, (Busck), 1 ♀.

Zone limit, five miles west of Empire, C. Z., Pan., XI, 14, 1913, (Hebard; from jungle undergrowth), 1 ♀.

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Old Panama, Pan., I, 31, 1911, (Schwarz), 1 ♀.

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; beaten from flowering weeds on edge of jungle), 1 ♂, 1 ♀.

Ancon, C. Z., Pan., (Jennings; from bush), 2 ♀.

This remarkable species has recently been thoroughly described for the male sex by Rehn.[153] It represents a distinctive and aberrant unit of the genus, which we would term the Parishi Group.

The female sex closely resembles the male, differing in having the tegmina slightly shorter, the interocular space very slightly wider, very slightly greater than that between the antennal sockets, the supra-anal plate more distinctly and sharply bilobate distad and subgenital plate of considerable lateral length, with a decided medio-longitudinal cleft distad.

All of the specimens here recorded are of a more intensive coloration than the two originally described Brazilian examples, the head with face blackish chestnut brown, shading to a paler brown on the occiput. In the two palest examples the head is ochraceous-tawny, tinged with chestnut brown only above the clypeal suture.

In the immature condition, the pair of lateral, poorly defined dark pronotal bars are continued on the mesonotum and metanotum, and as a narrow suffusion margining the entire dorsal surface of the abdomen; the four proximal dorsal abdominal segments, in addition, each have a few microscopic dots of dark brown along the caudal margin.

Chorisoneura panamae new species (Plate VI, figures 9 and 10.)

The present species is a member of what we term the Pellucida

[153] The ventral femoral margins, in our opinion, are supplied, characteristically, with a few hairs, rather than "supplied with a few weak, short spines." The male supra-anal plate is about one-third as long as its basal width, with apex broadly truncate and subbilobate.

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Group.[154] It is closely related to *C. pellucida* Saussure,[155] agreeing closely in size, form and general coloration, but differs in the following respects: head with occiput dark, interocular-ocellar area whitish, with a pair of approximate dark brown dots and a smaller pair of more widely separated dots; pronotum with two short, longitudinally parallel, pale lines; much less transverse male supra-anal plate, and male subgenital plate with styles and intervening process distinctive.

Close relationship to *C. lata* Rehn, recently described from Pará, Brazil, is also shown. Comparison with the type of that species shows close agreement in size, form, general coloration and pronotal marking, that insect differing, however, in the following features: head immaculate[156] with two widely separated dark dots in the interocular-ocellar area; narrower pellucid border of tegmina; male subgenital plate with styles less elongate, broader and more truncate distad, the interval between their bases showing no mesal production whatever, but only two minutely microscopic decurved teeth.

In *C. tessellata* Rehn, from Ceará Mirim, Brazil, in addition to the distinctive coloration, we would note that the styles are of the type found in *pellucida*, but that the minute triangular production between their bases, though similar in form, is in *tessellata* surmounted by a single minute, but heavy, decurved tooth.

[154] This group includes a number of relatively large, broad species, all of which show marked specialization of the area between the styles of the male subgenital plate. In the collections at hand the following species belong to this group; *lata* Rehn, *panamae* here described, *pellucida* Saussure and *tessellata* Rehn. The two latter species show greater specialization of the male styles, these having their apices inwardly produced and overlapping, while the shafts of the styles are parallel in normal position and do not diverge.

Specimens at hand, recorded by Rehn as *C. minuta* Saussure and *C. perlucida* (Walker), represent a closely allied group, agreeing in general size and form, but having the greatest male genitalic specialization on the internal margin of the sinistral style, near its base, and showing no specialization of the median area between the bases of the styles.

[155] Saussure's original description of *pellucida*, from a Mexican female, is excellently supplemented by his later treatment of the species, from both sexes, taken near Moyoapan, Mexico (Hist. Nat. Mex., Rech. Zool., vi, p. 92, pl. ii, figs. 49 and 49a, (1870)). His color figure is excellent, except that the general coloration should apparently have a decidedly more orange tinge. Our comparisons here are supplemented by examination of a male of *pellucida* from San Rafael, Vera Cruz, Mexico, in the Hebard Collection.

[156] The type, however, has the head decidedly discolored. The species may be found to have the interocular-ocellar area pale, as in *panamae*.

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Type.—♂; Porto Bello, Panama. April 17, 1912. (A. Busck.) [United States National Museum.]

Size large for the genus; form depressed, in outline elongate elliptico-ovoid. Head broad, decidedly depressed; from the dorsum practically the entire occiput and cephalic half of the eyes are seen to be exposed, occipital outline truncate, the eyes almost imperceptibly projecting beyond the interocular area; interocular space broad, one and one-half times occipital ocular depth, about four-fifths as wide as space between antennal sockets. Antennae nearly one and one-half times as long as body. Maxillary palpi with third joint elongate and slender; fourth joint three-quarters as long as third; fifth joint subequal in length to fourth, moderately enlarged.

Pronotum transverse elliptical, with a rectangulate tendency, due to the wide and strongly transverse cephalic and caudal margins, cephalic margin showing a trace of convexity only above head, caudal margin showing a very feeble convexity, lateral margins broadly convex, rounding evenly into cephalic and caudal margins; greatest width of pronotum mesad; disk with a shallow medio-longitudinal impression and a pair of brief oblique sulci laterad, lateral portions weakly declivent cephalad, where the surfaces are very shallowly concave, weakly bossed over the tegminal bases. Tegmina elongate, extending briefly beyond cercal apices, greatest width at proximal third, thence narrowing evenly to near the sharply rounded but acute apex; marginal field very broad; discoidal vein with (sixteen) branches, between which are a number of well developed false nervures, discoidal sectors (fifteen, counting all branches) strongly oblique.[157] Wings with a considerable intercalated triangle, acute-angulate proximad; (fourteen) costal veins (with nine) heavily and briefly clubbed distad, the more distal with clubbed portion more elongate and slender; discoidal and median veins connected by (ten) distinct cross-veinlets; ulnar vein branching near extremity and sending another branch to the margin of the intercalated triangle; axillary vein branching twice; the distal branch bifurcate.

Sixth dorsal abdominal segment with a large but not strongly concave area mesad, the margins of which are feebly raised latero-cephalad, convex, the depression containing a moderate number of agglutinated hairs, closely pressed upon its surface. Supra-anal plate nearly one-third as long as basal width, triangular, with apex broadly truncate and lateral margins very feebly concave, convergent. Cerci elongate, depressed, fusiform, very slender distad, tapering to acute apices. Subgenital plate with sinistral margin short and straight to base of sinistral style, dextral margin longer and moderately concave to base of dextral style; styles situated in poorly defined sockets, very elongate, broad at bases, tapering to apices which are lamellate and rounded, this strongest externally, each supplied on its internal face just before the apex with a central patch of microscopic teeth; between the styles the median portion of the plate is produced in a slender chitinous shaft, approximately half the length of one of the styles, armed at its apex with two small,

[157] Five of the discoidal sectors spring from the discoidal instead of from the median vein distad; this is an amplification of the condition found in many other forms of *Chorisoneura*.

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slender, chitinous teeth, which curve toward each other, thus giving this portion some resemblance to one of the smaller claws of a crab.

Ventro-cephalic margin of cephalic femora armed with a row of minute and somewhat irregular microscopic chaetiform spines, of which the more proximal are the longer, terminated by a single elongate distal spine. Other limb characters as given on page 132 for *C. fuscipennis*, there described.

Allotype.— ♀; Porto Bello, Panama. April 21, 1912. (A. Busck.) [United States National Museum.]

Agrees closely with type. Tegmina nearly as elongate. Interocular space wider, fully four-fifths as wide as space between antennal sockets. Supra-anal plate triangularly produced, strongly notched at apex, this rounded emarginate, deeper than wide, the two sharply rounded portions thus formed with surfaces moderately convex, lateral margins feebly concave. Subgenital plate ample, narrow distal portion reflexed, longitudinally cleft mesad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *type*.....	10	2.4	3.9	10.9	3.4
Rio Trinidad, *paratype*....	10.1	2.4	3.9	10.3	3.2
Rio Trinidad, *paratype*....	10	2.4	3.9	10.7	3.4
♀					
Porto Bello, *allotype*.....	10.7	2.4	3.9	9.9	3.2

Head with vertex tawny to narrowest point between eyes, where this color is in abrupt contrast with the warm buff interocular-ocellar area. In this intersection are two conspicuous dots of dark chestnut brown, equally distant from each other and from the eyes, while just below these in the buffy area are two smaller and much more widely separated dots of the same color near the margins of the eyes; remaining portions of face warm buff washed with ochraceous-tawny. Pronotum with hexagonal disk ochraceous-orange tinged with tawny, very narrowly margined with whitish, with two medio-longitudinal parallel lines of light buff, which in length are slightly less than one-half that of the disk,[188] lateral portions transparent, very faintly tinged with buckthorn brown. Remaining portions of dorsal surface ochraceous-buff strongly washed with ochraceous-orange, a conspicuous dot of light buff mesad on the moderately large, exposed scutellum. Tegmina transparent, marginal and external two-thirds of scapular field immaculate, faintly tinged with buff, remaining portions with veins and veinlets transparent, faintly tinged with buff, the intervening areas tinged with ochraceous-orange.[189] Wings transparent, washed with ochraceous-orange, this decided in area of costal veins and distad in anterior and radial fields. Ventral surface ochraceous-buff washed with ochraceous-

[188] Minute flecks of light buff, latero-cephalad of and adjacent to these lines are found, subobsolete or distinctly indicated, in the series at hand.

[189] This pencilling as in *pellucida*, stronger than in *lata*, much less conspicuous than in *tessellata*.

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orange. Limbs light ochraceous-buff, the spines and tarsal claws faintly tinged with ochraceous-orange.

In addition, two male paratypes, taken on the Rio Trinidad, Panama, by A. Busck, March 17 and June 3, 1912, are before us.

Chorisoneura fuscipennis new species (Plate VI, figure 11.)

The present species is closely related to *C. flavipennis* Saussure and Zehntner,[160] with which it agrees in general size, reddish general coloration and immaculate head. The present species is distinguished by the color of the tegmina, which are less suffused and not as tawny; dark wings, with area of clubbed portions of costal veins buffy; male subgenital plate having the styles more elongate and slender, and in the female by a slight, but distinctly less, reduction in the organs of flight.

These two species form a unit in the genus, which we would call the Flavipennis Group.

As in *flavipennis*, examples showing intensive coloration have the humeral trunk strongly darkened, but, unlike that species, the pronotum then has the caudal margin very narrowly whitish.

Type.—♂; Porto Bello, Panama. February 24, 1911. (A. Busck.) [United States National Museum.]

Size large for the small species of the genus; form depressed; surface glabrous. Head with occiput largely exposed cephalad of pronotum; interocular space slightly less than one and one-half times the occipital ocular depth, distinctly less than width between antennal sockets. Ocelli obsolete. Maxillary palpi with fourth joint three-fifths length of third, fifth (distal) joint slightly longer than fourth.

Pronotum transverse, subelliptical, greatest width very slightly caudad of mesal point; caudal margin transverse, very feebly convex, cephalic margin slightly more convex. Tegmina surpassing abdomen by more than pronotal length, elongate lanceolate; costal and sutural margins evenly and feebly convergent, straight from proximal third to distal portion of tegmina, where they are convex convergent to the moderately acute angulate, sharply rounded apex; marginal field narrow, reaching only slightly distad of apex of anal field; discoidal vein longitudinal, with (twelve to fifteen) straight costal branches and with (one to two) branches at apex toward sutural margin; discoidal sectors (five) oblique. Wings with appendicular field well developed, its length slightly less than width, basal outline forming very slightly more than a right angle; (eight to nine) costal veins briefly and heavily clubbed distad, discoidal and median veins connected by (seven to nine, and one or two incom-

[160] Described from Atoyac, Vera Cruz, Mexico. We have made the above comparisons from two males and two females from Guatemala and Costa Rica (three recorded by Rehn from Turrialba, Costa Rica).

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plete) moderately heavy transverse veinlets, lesser veinlets distad connect the median, ulnar and anal veins, which veins curve distad toward the costal margin; axillary vein with two branches. Sixth dorsal abdominal segment with a large circular area mesad which is weakly concave, supplied with agglutinated hairs closely pressed against its surface.

Supra-anal plate with length about one-third proximal width, trigonal, lateral margins concave convergent to the moderately broad, rounded apex, which is supplied with a few setae. Cerci elongate fusiform, dorsal surface flattened, well supplied laterad and ventrad with elongate setae. Subgenital plate very small, brief lateral portions reflexed with free margins weakly concave, oblique to the two elongate styles, which are set deeply into sockets, between which the brief median portion of the plate is oblique, slightly the more produced dextrad; styles similar, straight, compressed cultriform, margins converging to acute apices, nearly four times as long as basal width, extending slightly beyond apex of supra-anal plate.

Ventro-cephalic margin of cephalic femora armed with a long row of minutely microscopic chaetiform spines, terminated by a single elongate distal spine, other ventral femoral margins unarmed except distad, supplied with a few moderately elongate hairs, both margins of median and caudal femora with a single elongate distal spine. Caudal metatarsus distinctly longer than combined length of succeeding joints. Fourth tarsal joint, alone, with ventral surface fully occupied by a pulvillus. Large arolia present between the asymmetrical tarsal claws.

Allotype.— ♀; Taboga Island, Panama. June 9, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with male. Tegmina slightly less elongate. Interocular space wider. Subgenital plate ample, with a meso-distal longitudinal cleft.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Porto Bello, *type*.....	8.8[161]	2	2.9	7.8	2.6
Cabima, *paratype*.....	7.8	1.9	2.9	7.8	2.6
♀					
Taboga Island, *allotype*....	7.8	2	2.9	7.6	2.7

In the type the length of the wing is 8.1; of appendicular field, 2.; width of appendicular field, 2.7 mm.

Head and dorsal surface of abdomen dull ochraceous-orange. Eyes blackish. Two proximal joints of antennae ochraceous-buff, succeeding joints blackish.[162] Disk of pronotum dull ochraceous-orange, lateral portions transparent, very faintly tinged with buckthorn brown, caudal margin very narrowly whitish. Tegmina transparent, tinged with buckthorn brown, the humeral trunk suffused with prout's brown to nearly as far distad as apex of anal field; area of dextral tegmen concealed when at rest, suffused with mummy brown in the type, as pale as the other

[161] Crushed, normal length probably about as in paratype.

[162] All but the proximal eighteen joints of the antennae are missing.

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portions in the paratype. Wings transparent, iridescent, tinged with mummy brown, area of costal veins and distal areas toward appendicular field mummy brown in type, prout's brown in other specimens, except area of swollen portions of costal veins which is whitish; appendicular field heavily tinged with mummy brown in type, prout's brown in other specimens. Ventral surface pale ochraceous-tawny, with abdominal segments narrowly margined with ochraceous-buff. Limbs ochraceous-buff.

The allotype is clearly a recessive example and has the tegmina immaculate.

In addition to the type and allotype, we have before us a paratypic male, taken at Cabima, Panama, May 21, 1911, by A. Busck.

Chorisoneura translucida (Saussure) (Plate VI, figures 12 and 13.)

1864. *Bl[atta] translucida* Saussure, Rév. et Mag. de Zool., (2), xvi, p. 311. [[♀], Mexico.]

1870. *Chorisoneura translucida* Saussure, Miss. Sci. Mex., Rech. Zool., vi, p. 91. [More detailed diagnosis: ♂, ♀; Cordillera Oriental, Mexico.]

Tabernilla, Canal Zone, Panama, V, 10, 1907, (Busck), 1 ♂.

Gold Hill, C. Z., Pan., XI, 14, 1913, (Hebard; beaten from vines covering low bushes), 1 juv. ♀.

Paraiso, C. Z., Pan., I, 17 to V, 5, 1911, (Busck, Schwarz), 3 ♂, 2 ♀, 1 small juv. ♂, 2 very small juv.

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; in jungle vegetation), 1 juv. ♀.

The series of adults differs from the majority in a Mexican series before us, in having the tegmina more suffused with brown between the veins, except toward the costal margin. Some variation in this respect is, however, shown by the Mexican series.

The male sex has relatively short stout styles with interval between their bases relatively broad, the dextral style having beneath its base sinistrad a pair of microscopic decurved teeth. The margin of the subgenital plate appears to be somewhat irregular and subject to some individual variation.

Our recent remarks on this species[163] can not be supplemented until much larger series are secured.

The large immature examples before us are pale and immaculate ochraceous-tawny dorsad, except that the abdominal segments are marked with microscopic and rather distant flecks of ochraceous-tawny, while at the latero-caudal angles of the fifth segment are large blotches of mummy brown, the sixth segment being lined at that point along the caudal margin with the same color.

[163] Trans. Am. Ent. Soc., xlv, p. 119, (1919).

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Chorisoneura cabimae new species (Plate VI, figures 14 and 15.)

Of the species of *Chorisoneura* before us, the present insect shows nearest relationship to *C. translucida* (Saussure). It differs in the distinctive interocular marking and male genitalia. The styles show the greatest truncation of any species of the genus at hand.

The tegmina have the veins and interspaces unicolorous, as in the majority of Mexican specimens of *translucida* before us, but unlike material from the more southern portions of the continent which we have assigned to that species.

Type.—♂; Cabima, Panama. May 19, 1911. (A. Busck.) [United States National Museum.]

Size medium for the small species of the genus; form depressed, surface glabrous. Head with occiput largely exposed. Interocular space about one and one-fourth times the occipital ocular depth, about two-thirds the width between the antennal sockets. Maxillary palpi with fifth joint enlarged and elongate, slightly longer than third, fourth about three-quarters as long as third joint.

Pronotum transverse, subelliptical; greatest width meso-caudad; cephalic and caudal margins transverse, feebly convex; latero-cephalic angles distinctly more broadly rounded than latero-caudal angles. Tegmina surpassing apex of abdomen by slightly more than pronotal length, strongly elongate lanceolate, narrower than in *C. specilliger* and *C. gemmicula* here described; costal and sutural margins evenly and feebly convergent, straight from proximal third to the sharply rounded apex, as in *translucida*, distinctly less acute than in *specilliger* and *gemmicula*; scapular field as in *translucida*, not as broad as in *specilliger* or *gemmicula;* discoidal vein longitudinal with (twelve to fourteen in series, of which two to five distal are subobsolete) costal branches which are almost straight; discoidal sectors (five to eight) oblique. Wings and venation very delicate; appendicular field nearly as long as broad, basal outline forming very slightly more than a right-angle; costal veins (seven to nine) moderately heavily clubbed distad, the clubs not as heavy as in *specilliger* or *gemmicula*, discoidal and median veins connected by (six to seven in series) very inconspicuous transverse veinlets, other transverse veinlets subobsolete. Dorsal surface of abdomen with sixth segment specialized, showing a relatively large but shallow, subcircular median depression, the caudal margin of which is somewhat raised and thickened, the depressed area containing a number of agglutinated hairs, closely pressed upon its surface and directed longitudinally.

Supra-anal plate triangularly produced, with sides feebly concave to the rather broadly rounded apex, length one-third basal width. Subgenital plate small, latero-caudal portions minutely produced and sharply rounded outside cercal bases, brief lateral portions of free margin thence nearly transverse, subconcave, to the large styles which are set in sockets; styles heavy, slightly over twice as long as broad, lamellate, with a weakly oblique row of microscopic teeth on interno-caudal face near apex, the apex itself broadly rounded, truncate, with a minute and sharply

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rounded projection mesad; very brief portion of plate between bases of styles minutely triangularly produced, unspecialized, fitting tightly between bases of styles.

Cephalic femora with ventro-cephalic margin supplied with a long row of short, closely placed, microscopic piliform spines, terminated by a single elongate and moderately slender spine. Other ventral femoral margins unarmed except distad, but supplied with a few moderately elongate hairs, both margins of median and caudal femora with a single elongate, moderately slender distal spine. Median and caudal femora with an elongate, moderately slender, dorsal genicular spine. Caudal metatarsus very much longer than combined length of succeeding joints, supplied ventrad with a double row of widely spaced, microscopic chaetiform spines; fourth tarsal joint alone with ventral surface fully occupied by a pulvillus. Large arolia present between the asymmetrical tarsal claws.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cabima *type*	7.8	1.8	2.6	7.6	2.1
Cabima, *paratype*	8.2	1.8	2.5	7.3	2
Porto Bello, *paratype*	7.5	1.8	2.6	7.1	2

In the type the wing is 7.1 by 4.5; the appendicular field, 1.9 by 2 mm.

Head with vertex pale ochraceous-tawny, to a broad, blackish chestnut brown band between the eyes, face entirely buffy. Underparts and limbs ochraceous-buff, ventral surface of abdomen light buff. Pronotum with disk pale ochraceous-tawny, remaining portions transparent, very weakly tinged with buckthorn brown. Tegmina, including veins, transparent, weakly tinged with buckthorn brown, except narrowly along costal margin, where they are very weakly tinged with the same color. Wings transparent, with an exceedingly faint yellowish-brown tinge; in area of costal veins and distad in anterior and radial fields faintly tinged with ochraceous-buff. Dorsal surface of abdomen light buff, cerci light ochraceous-buff.

In the specimen from Porto Bello, intensification in coloration is shown. The face and abdomen is buckthorn brown, the disk of pronotum and vertex light cinnamon brown.[164]

In addition to the type, the following paratypes are at hand.

Porto Bello, Panama, II, 24, 1911, (Busck), 1 ♂.
Cabima, Pan., V, 26, 1911, (Busck), 1 ♂.

Chorisoneura specilliger[165] new species (Plate VI, figures 16 to 19.)

The present insect has the vertex showing two white bands, very similar to those found in *C. translucida* (Saussure), but the adjacent and intervening areas are all pale brown; the tegmina are broader, show distinctive features of venation and taper more evenly and decidedly distad from their point of greatest width.

[164] Possibly due to discoloration.
[165] The probe bearer.

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The general coloration is richer and the male genitalia are distinctive, particularly in the type of specialization of the median portion of the subgenital plate.

In tegminal form and type of coloration closer similarity is shown to *C. gemmicula*, here described, under which species comparison is made, and to *C. albonervosa* Rehn, the much richer and more striking coloration, much fewer tegminal veins and differently specialized male subgenital plate readily distinguishing that species.

Type.— ♂; Gatun, Canal Zone, Panama. July 28 to August 5, 1916. (D. E. Harrower.) [Hebard Collection, Type no, 497.]

In the features not mentioned here the present species agrees fully with *C. cabimae*, described on page 134. Size medium for the small species of the genus. Interocular space about one and one-third times the occipital ocular depth, two-thirds the width between the antennal sockets. Maxillary palpi with third joint slightly longer than fifth, the latter decidedly enlarged, fourth joint slightly shorter than fifth.

Pronotum transverse, nearly elliptical, greatest width almost mesad;[106] cephalic and caudal margins transverse, very feebly convex, cephalic angles more broadly rounded than caudal angles.

Tegmina surpassing abdomen by more than pronotal length, decidedly elongate lanceolate, costal and sutural margins evenly and feebly convergent, straight from proximal third to distal portion of tegmen, where they are convex convergent, the sutural margin over a greater distance, to the decidedly acute-angulate, very sharply rounded apex; scapular field broad, much broader than in *translucida;* discoidal vein longitudinal, with (thirteen to seventeen in series) costal branches, the more proximal of which (about seven) are distinctly arcuate, with or without a branch at apex toward sutural margin, discoidal and median veins much closer together than in *translucida;* discoidal sectors (eight to ten in series) oblique.

Wings of the general type found in the Pellucida Group, not as in the Translucida Group; with intercalated triangle rather than appendicular field relatively moderately well developed, its length approximately equal to its width, basal outline forming an angle distinctly less than a right-angle; (nine to twelve in series) costal veins briefly and heavily clubbed distad, discoidal and median veins connected by (seven) inconspicious transverse veinlets, other distal transverse veinlets between median, ulnar and anal veins extremely weak. Median depression of sixth dorsal abdominal segment shallow.

Supra-anal plate strongly transverse, length slightly over one-fifth proximal width, caudal margin broadly convex, showing weak indication of bilobation. Subgenital plate very small, brief lateral margins concave to the large styles which are deeply inset in sockets, the dextral the more so; styles elongate, length about three times basal width, trilamellate, tapering from large and briefly swollen base (this the more ample for the dextral style) to acute apex, which extends beyond the distal margin of the

[106] In *translucida* and *C. panamae* here described, with greatest width meso-caudad and latero-cephalic angles much more broadly rounded than latero-caudal angles.

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supra-anal plate; very brief margin between styles rather sharply concave, from which springs, beneath the sinistral portion of the base of the dextral style, a slender chitinous shaft, slightly less than half as long as the style, bearing five slender elongate teeth, four along dextral margin directed disto-dextrad and one at apex directed distad.

Allotype.— ♀ ; Paraiso, Canal Zone, Panama. March 26, 1911. (A. Busck.) [United States National Museum.]

Agrees rather closely with male. Form slightly broader, tegmina distinctly shorter, only slightly surpassing cercal apices.[167] Interocular space broader, fully one and one-third times occipital ocular depth, three-quarters the width between the antennal sockets. Dorsal surface of abdomen not specialized. Supra-anal and subgenital plates as described for the female of *gemmicula*.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Gatun, *type*	7.7	1.9	2.8	7.9	2.6
Gatun, *paratype*	7.4	1.9	2.8	7.8	2.6
Porto Bello, *paratype*	6.8	1.8	2.7	7.8	2.3
Rio Trinidad, *paratype*	7.7	1.8	2.8	8	2.4
Juan Mina, *paratype*	6.8	1.8	2.7	7.2	2.4
♀					
Paraiso, *allotype*	6.7	1.8	2.7	7.1	2.4

Head dull ochraceous-orange, with two narrow bands of ochraceous-buff between the eyes, of equal width, separated by a slightly narrower interval of the general coloration, the lower band continued narrowly for a brief distance along the ventral margin of the eyes, as in *translucida*. Proximal antennal joint of general coloration washed with darker brown, succeeding joints in proximal third of antennae mummy brown, shading gradually to remaining portions which are ochraceous-buff. Pronotum with disk tawny, pronotum very narrowly margined for a brief distance meso-cephalad and along the entire caudal margin with whitish,[168] lateral portions transparent, very faintly tinged with buckthorn brown. Tegmina with marginal field and half of costal field toward costal margin transparent, very faintly tinged with buckthorn brown, remaining portions rather strongly tinged with buckthorn brown, the numerous veins very faintly tinged with that color, except the humeral trunk which is suffused with prout's brown. Wings transparent; radiate field to axillary vein tinged with mummy brown, remaining portions tinged with ochraceous-buff, approaching ochraceous-tawny in area of branches of axillary

[167] The small series shows that some variation in size and considerable variation in tegminal length occurs in the present species. In view of the fact that the two females of the closely related *gemmicula* show less tegminal reduction, we would expect to find females of the present species with tegmina of greater length, as well as the condition shown by the single female at hand.

[168] Thus showing nearest agreement with *albonervosa* in pronotal coloration.

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vein, and in area of costal veins opaque, first ochraceous-tawny, then mummy brown, then in area of clubbed portions of veins buffy.[169] Dorsal surface of abdomen dull ochraceous-orange, cerci slightly paler. Ventral surface ochraceous-tawny, shading to ochraceous-buff on abdomen. Limbs ochraceous-buff tinged with orange.

The allotype and a paratypic male from Gatun show the maximum recessive coloration of the series; the head and disk of pronotum are ochraceous-tawny, the tegmina likewise paler. The distinctive occipital markings and character of tegminal coloration occur virtually unaltered. The brown of the radial field of the wings, however, does not contrast nearly as conspicuously with the more reddish remaining portions, nor is the clubbed area of the costal veins as conspicuously buffy.

In addition to the type and allotype, the following paratypic series is at hand.

Porto Bello, Panama, II, 19, 1911, (Schwarz), 1 ♂.
Gatun, Canal Zone, Pan., VII, 17 to 23, 1916, (Harrower), 1 ♂.
Rio Trinidad, Pan., V, 1, 1911, (Busck), 1 ♂.
Juan Mina Plantation, C. Z., Pan., VII, 13, 1918, (Dietz and Zetek; sweeping grass), 1 ♂, [U. S. N. M.].

Chorisoneura gemmicula new species (Plate VI, figures 20 to 22.)

The present insect is closely related to *C. specilliger*, described in the preceding pages. In addition to marked differences in the male genitalia, the present species differs in the much more distinctive cephalic and pronotal markings. In other features of coloration, however, these two species agree to an exceptional degree.

Type.—♂; Cabima, Panama. May 20, 1911. (A. Busck.) [United States National Museum.]

Size, interocular width, maxillary palpi, pronotum, tegmina (discoidal vein with fourteen to sixteen costal branches, with two or three branches at apex toward sutural margin; discoidal sectors eleven to twelve in series), wings (twelve costal veins, discoidal and median veins connected by eight inconspicuous transverse veinlets), supra-anal plate and character of limbs as in *specilliger*.

Subgenital plate rather small; lateral margins form small plates beneath cercal bases, thence these margins are brief to the styles, which are not as deeply inset in sockets as in *specilliger*; sinistral margin moderately convex from small subcercal production, the area contained by this convexity somewhat swollen; dextral margin oblique from base of small subcercal production; styles elongate, trilamellate, tapering from large base to distal three-fourths, where a shoulder occurs, the cephalic external portion thence produced, slender, to the sharply acute apex;

[169] This distinctive type of tegminal and wing coloration is duplicated in full in *gemmicula*. It does not occur in any other species of *Chorisoneura* known to us.

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dextral style similar, but with externo-caudal proximal portion enlarged, forming a considerable lobe, which is seen to be concave on its cephalic face; margin between the styles brief, dextrad produced beneath the sinistral portion of the base of the dextral style, in a small, subquadrate plate, which bears on its distal margin two microscopic, decurved teeth.

Allotype.— ♀ ; Alhajuela, Panama. April 17, 1911. (A. Busck.) [United States National Museum.]

Agrees closely with male. Form slightly broader, tegmina slightly shorter. Interocular space wider, one and three-quarters times as broad as the occipital ocular depth, about four-fifths as wide as space between antennal sockets. Dorsal surface of abdomen unspecialized. Supra-anal plate triangularly produced, apex moderately broadly cleft a distance twice the median width of this cleft,[170] lateral portions thus formed sharply rounded, each about three times as wide as the cleft at its median portion, surfaces convex. Subgenital plate scoop-shaped, with marginal convexity greatest latero-caudad, distal portion sharply reflexed, broad mesad with a medio-longitudinal cleft, this reflexed portion narrowing rather strongly to opposite cercal bases where it disappears.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cabima, *type*.....	8	1.8	2.8	8	2.7
Rio Trinidad, *paratype*.....	7.4	1.8	2.8	8	2.6
♀					
Alhajuela, *allotype*.....	7.1	2	2.8	7.8	2.6
Porto Bello.....	7.2	1.9	2.8	7.6	2.5

In the type the wing is 7.9 by 4.9; the intercalated triangle, 1.95 by 1.95 mm.

Head with vertex dull ochraceous-orange, a rather broad cream colored band between the eyes, below this with a very narrow band of blackish brown, below this a band of cream color of double the width of the dorsal band of this color, which laterad runs along the eyes to the ocellar areas, which are light ochraceous-buff; below this band the face is blackish brown in a large subquadrate area, the remaining portions light ochraceous-buff. Ventral surface ochraceous-tawny, shading to ochraceous-buff on abdomen. Limbs ochraceous-buff tinged with ochraceous-tawny. Pronotum with disk dull ochraceous-orange, with two large spots of light ochraceous-buff meso-caudad, the margins of which are poorly defined; pronotum rather broadly margined for a brief distance meso-cephalad and along the entire

[170] As the length of the supra-anal plate shows differences of specific diagnostic value in males of *Chorisoneura*, we believe that the degree of production of the female subgenital plate may prove to have some value as well. Slight differences in the character of the apical cleft, however, such as shown between *C. panamae*, here described, and the present species may be due to individual variation. We have already ascertained that, in *Ischnoptera*, the form of the apex of the female supra-anal plate is subject to decided variation in some of the species. In the present genus females hold the extruded ootheca firmly with margins fitting into the distal clefts of the supra-anal and subgenital plates.

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caudal margin with whitish, as in *C. albonervosa* Rehn,[171] lateral portions transparent, very faintly tinged with buckthorn brown. Tegmina and wings colored as in *specilliger*. Dorsal surface of abdomen dull ochraceous-orange.

In addition to the type and allotype, a female is at hand, taken at Porto Bello, Panama, March 13, 1911, by A. Busck, and a paratypic male, taken on the Rio Trinidad, Panama, May 5, 1911, by A. Busck.

Subfamily PERISPHAERINAE

LITOPELTIS[172] new genus

The present genus belongs to the second section of the Perisphaerinae, containing *Stenopilema* Saussure and its allies. To this section also belong the American genera *Colapteroblatta*, *Poroblatta* and *Acroporoblatta*, recently described from Colombia by the author,[173] and *Mioblatta* Saussure, described from Brazil.[174] The present genus would superficially appear to be more closely related to *Mioblatta* than to the others, and represents a unit having a distinctly Panchlorine facies. Closer examination shows, however, that nearest relationship with *Colapteroblatta* exists, this indicated by the general similarity of tegminal and wing form and venation and limb armament.

From the original description of the male sex of *Mioblatta*, we find that males of *Litopeltis* differ in their larger size, somewhat broader form, lack of pubesence, smooth vertex without carinae, polished and not thickly microscopically impresso-punctate pronotum with cephalic margin showing feeble truncation, wings with proportionately narrower marginal field, ulnar vein with numerous incomplete branches and armed femora.

Compared with the male type of *Colapteroblatta compsa* Hebard, this sex of *Litopeltis* is found to differ in the decidedly smaller size, ocelli which are represented by poorly defined large ocellar spots, more convex pronotum with lateral wings strongly declivent and caudal margin more angulate and caudal metatarsus which is as long as the combined length of the succeeding tarsal joints. The females of these species differ similarly in size and in caudal meta-

[171] A further development of the type found in *specilliger*.

[172] From λιτή and πέλτη = smooth shield.

[173] Trans. Am. Ent. Soc., xlv, pp. 120 to 127, pl. xix, figs. 1 to 6, (1919).

[174] Rev. Suisse de Zool., iii, p. 56, pl. i, figs. 15 to 15c, (1895).

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tarsal proportions, to a much less degree in form of pronotum, due to the more hooded type developed in this sex of *Colapteroblatta*, while in *Litopeltis* the tegmina are subquadrate.

GENOTYPE: *Litopeltis bispinosa* [*Calolampra bispinosa*] (Saussure).

Generic Description.—Size rather small for the group; form dissimilar in the sexes, male elongate, rather broad with dorsal surface of abdomen showing scarcely any convexity, female less elongate, broad, with dorsal surface of abdomen evenly convex. Surface of head and pronotum polished, microscopically and not thickly impresso-punctate. Interocular space of male broad, of female broader, in neither sex equal to width between antennal sockets. Ocelli represented by large, poorly defined spots in male; similar but smaller in female.

Pronotum with disk moderately convex, lateral wings strongly declivent, unspecialized; cephalic margin of pronotum showing weak truncation and caudal margin weakly obtuse-angulate produced with apex broadly rounded. Tegmina of male elongate, extending well beyond apex of abdomen; of female heavily chitinous, subquadrate, with sutural margins overlapping. Wings of male fully developed, of female small oval atrophied pads. Supra-anal plate of male very delicate, showing only a trace of bilobation; of female heavily chitinous with distal margin convex.

Limbs moderately heavy in male, very slightly more so in female. Ventro-cephalic margin of cephalic femora supplied with a fringe of chaetiform hairs, terminating distad in a single heavy, much reduced spine; ventro-caudal margin armed distad with (one[175] and one distal) heavy spines. Ventro-cephalic margin of median and caudal femora armed with (one or two and one distal) heavy, reduced spines. Ventro-caudal margin of median femora armed with (three or four, usually four, and one distal) heavy spines, of caudal femora with (three or four, usually three, and no distal) heavy spines. Four proximal tarsal joints with ventral surfaces unarmed, occupied by large pulvilli which are bluntly angulate produced distad, that of metatarsus linear in proximal portion. Moderate arolia present between the delicate tarsal claws.

[175] Very rarely this spine is absent.

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Litopeltis bispinosa (Saussure) (Plate VI, figure 23.)

1893. [*Calolampra*] *bispinosa* Saussure, Societas Entomologicae, viii, p. 58. [♂, Nova Granada[176] (Colombia).]

1893. *Calolampra bispinosa* Saussure and Zehntner, Biol. Cent.-Am., Orth., i, p. 67, pl. iii, fig. 26. [♂ [nec ♀], Panama.]

1914. *Audreia marginata* Caudell, Insec. Inscit. Menst., ii, p. 77. [♀; Porto Bello, Panama.]

Porto Bello, Panama, (Jennings; in bromeliads), 1 ♀, *type* of *Audreia marginata* Caudell; II, 23 and 28, 1911, (Busck, Schwarz) 1 ♂, 1 juv. ♂.

Gatun, Canal Zone, Pan., VII, 25 to VIII, 22, 1916, (Harrower; from rotting banana stalks, at bases of leaves), 4 ♂, 8 ♀, 2 large juv. ♂, 4 large juv. ♀, 29 juv. ♂, 27 juv. ♀, 4 very small juv. ♂, 1 very small juv. ♀.

Alhajuela, Pan., IV, 4 and 6, 1911, (Busck), 1 juv. ♂, 1 very small juv. ♀.

Frijoles, Canal Zone, Pan., (Schwarz), 1 juv. ♂.

Buena Ventura, Pan., III, 10, 1911, (Busck), 1 juv. ♀.

Boquete, Pan., III, 1914, (Zetek), 1 ♂, [U. S. N. M.].

Corozal, C. Z., Pan., XI, 17, 1913, (Hebard; tunnelling in dead banana stalk), 3 large juv. ♀.

The type of *Audreia marginata* Caudell, now before us, when compared with the series at hand, shows beyond question the synonymy indicated above. A slight superficial resemblance is shown by females of this species to females of *Audreia carinulata* Saussure. Close observation, however, shows that these species are members of different subfamilies.

The slight triangular invasion of the dark coloration of the pronotal disk meso-cephalad, into the pale lateral wings, is a feature shown also by *Colapteroblatta compsa* Hebard and *Poroblatta cylindrica* Hebard.

[176] Probably including Panama, at that time part of Colombia. This is, in all likelihood, the same specimen subsequently considered by Saussure and Zehntner, recorded by them from Panama.

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Explanation of Plates

Plate I

Map of the Canal Zone and vicinity, with localities indicated at which material studied in the present paper was taken.

Plate II

Fig. 1.—*Lissoblatta fulgida* (Saussure). Panama, Panama. Male. Dorsal view of tegmen. (×6)

Fig. 2.—*Lissoblatta fulgida* (Saussure). Porto Bello, Panama. Male. Distal outline of tarsal claws and arolium. (Greatly enlarged.) For difference between this genus and *Anaplecta*, compare figure 6.

Fig. 3.—*Anaplecta lateralis* Burmeister. Rio Trinidad, Panama. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 4.—*Anaplecta lateralis* Burmeister. Cabima, Panama. Female. Ventral view of subgenital plate. (Much enlarged.) Showing valvular type characteristic of this genus.

Fig. 5.—*Anaplecta asema* new species. Tabernilla, Canal Zone, Panama. Male. *Allotype*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 6.—*Anaplecta sordida* new species. Porto Bello, Panama. Female. *Type*. Distal outline of tarsal claws and arolium. (Greatly enlarged.) Type characteristic of this genus.

Fig. 7.—*Anaplecta gemma* new species. Porto Bello, Panama. Female. *Type*. Dorsal view of tegmen. (×6)

Fig. 8.—*Anaplecta hemiscotia* new species. Old Panama, Panama. Male. *Paratype*. Ventral view of subgenital plate. (Much enlarged.) From this angle the distal portion of the sinistral style is viewed obliquely.

Fig. 9.—*Anaplecta cabimae* new species. Cabima, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 10.—*Euthlastoblatta compsa* new species. Gatun, Canal Zone, Panama. Male. *Type*. Dorsal view of pronotum. (×7)

Fig. 11.—*Euthlastoblatta compsa* new species. Gatun, Canal Zone, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 12.—*Dendroblatta sobrina* Rehn. Rio Trinidad, Panama. Male. Dorsal view of pronotum. (×5.2). For difference between adult and immature color patterns, compare figure 13.

Fig. 13.—*Dendroblatta sobrina* Rehn. Rio Trinidad, Panama. Immature female. Dorsal view. (×5)

Fig. 14.—*Aglaopteryx lita* new species. Cabima, Panama. Female. *Type*. Dorsal view of pronotum. (×6.6)

Fig. 15.—*Aglaopteryx lita* new species. Cabima, Panama. Female. *Type*. Dorsal view of tegmen. (×5.2)

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Fig. 16.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Dorsal view of pronotum. (×6.5)

Fig. 17.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Dorsal view of tegmen. (×3.5)

Fig. 18.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Lateral view of subgenital plate. (Much enlarged.) From this angle, the lateral view of the dextral style is obtained in this drawing.

Fig. 19.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Distal view of subgenital plate. (Much enlarged.) From this angle, the lateral view of the sinistral style, but the distal view of the dextral style, is obtained in this drawing.

Fig. 20.—*Eudromiella bicolorata* new species. Taboga Island, Panama. Male. *Paratype.* Ventral view of subgenital plate. (Much enlarged.) From this angle, the dextral style can not be seen.

Fig. 21.—*Latiblattella inornata* new species. Rio Bejuco, Panama. Male. *Type.* Distal outline of tarsal claws and arolium. (Greatly enlarged.)

Fig. 22.—*Latiblattella angustifrons* new species. Porto Bello, Panama. Male. *Type.* Distal outline of tarsal claws and arolium. (Greatly enlarged.)

Fig. 23.—*Latiblattella angustifrons* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of styles and median process, apex of subgenital plate. (Greatly enlarged.) It is necessary to detach the subgenital plate in order to obtain this view.

Plate III

Fig. 1.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of pronotum. (×5.2)

Fig. 2.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of tegmen. (×2.5)

Fig. 3.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Dorsal view of wing. (×2.5)

Fig. 4.—*Macrophyllodromia splendida* new species. Porto Bello, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 5.—*Chromatonotus heterus* new species. Chorrera, Panama. Female. *Type.* Dorsal view of pronotum. (×8.7)

Fig. 6.—*Chromatonotus lamprus* new species. Tabernilla, Canal Zone, Panama. Male. *Type.* Dorsal view of pronotum. (×9.1)

Fig. 7.—*Chromatonotus lamprus* new species. Tabernilla, Canal Zone, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 8.—*Rhytidometopum megalopterum* new species. Tabernilla, Canal Zone, Panama. Male. *Paratype.* Dorsal view of wing. (×3)

Fig. 9.—*Rhytidometopum megalopterum* new species. Rio Trinidad, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 10.—*Neoblattella acanthastylata* new species. Gatun, Canal Zone, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

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Fig. 11.—*Neoblattella acanthastylata* new species. Gatun, Canal Zone, Panama. Male. *Type*. Distal view of distal portion of subgenital plate, showing styles. (Greatly enlarged.)

Fig. 12.—*Neoblattella panamae* new species. Rio Trinidad, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 13.—*Neoblattella impar* new species. Alhajuela, Panama. Male. *Paratype*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 14.—*Neoblattella chagrensis* new species. Gatun, Canal Zone, Panama. Male. *Type*. Lateral view of distal portion of concealed sinistral process. (Greatly enlarged.) The basal line is the declivent sinistral margin of the subgenital plate.

Fig. 15.—*Neoblattella nahua* (Saussure). Porto Bello, Panama. Male. Dorsal view of distal portion of abdomen and cerci, showing specialization of fifth dorsal segment. (×5)

Fig. 16.—*Neoblattella fraterna* (Saussure and Zehntner). Gatun, Canal Zone, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×5.5)

Plate IV

Fig. 1.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Cephalic view of head. (Much enlarged.)

Fig. 2.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Dorsal view of wing. (×3.3)

Fig. 3.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Distal outline of tarsal claws and arolium. (Greatly enlarged.)

Fig. 4.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 5.—*Lophometopum leptum* new species. Gatun, Canal Zone, Panama. Male. *Type*. Lateral view of subgenital plate. (Much enlarged.)

Fig. 6.—*Lophometopum leptum* new species. Upper Rio Pequeni, Panama. Immature male. Dorsal view, showing distinctive color pattern in the immature stages. (×5.5)

Fig. 7.—*Ischnoptera nox* new species. Porto Bello, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 8.—*Ischnoptera rufa rufa* (DeGeer). Montego Bay, Jamaica. Male. Lateral view of specialized distal portion of titillator. (Greatly enlarged.) Specialization of this organ greater in *rufa occidentalis*, for which compare figure 9.

Fig. 9.—*Ischnoptera rufa occidentalis* Saussure. Pózo Azul de Pirris, Costa Rica. Male. Lateral view of specialized distal portion of titillator. (Greatly enlarged.)

Fig. 10.—*Ischnoptera rufa occidentalis* Saussure. Vera Cruz, Vera Cruz, Mexico. Male. Lateral view of sinistro-dorsal concealed genitalic shaft. (Greatly enlarged.)

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Fig. 11.—*Ischnoptera gatunae* new species. Rio Trinidad, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 12.—*Ischnoptera inca* Saussure and Zehntner. Cabima, Panama. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 13.—*Ischnoptera mirella* new species. Porto Bello, Panama. Male. *Type.* Ventral view of subgenital plate, showing portion of specialized supra-anal plate visible from below. (Much enlarged.)

Fig. 14.—*Ischnoptera panamae* new species. Rio Trinidad, Panama. Male. *Paratype.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 15.—*Ischnoptera panamae* new species. Paraiso, Canal Zone, Panama. Male. *Paratype.* Specialized dextral portion of paired plate beneath supra-anal plate. (Greatly enlarged.)

Fig. 16.—*Xestoblatta immaculata* new species. Alhajuela, Panama. Female. *Type.* Dorsal outline of pronotum. (×3.3)

Fig. 17.—*Euphyllodromia angustata* (Latreille). Gatun, Canal Zone, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×7.5)

Fig. 18.—*Euphyllodromia decastigmata* new species. Gatun, Canal Zone, Panama. Male. *Type.* Dorsal view of pronotum. (×6)

Fig. 19.—*Euphyllodromia decastigmata* new species. Gatun, Canal Zone, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

Fig. 20.—*Euphyllodromia decastigmata* new species. Gatun, Canal Zone, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×7.5)

Plate V

Fig. 1.—*Pseudomops gloriosa* new species. Cabima, Panama. Female. *Type.* Dorsal view of pronotum. (×5.2)

Fig. 2.—*Pseudomops gloriosa* new species. Cabima, Panama. Female. *Type.* Dorsal view of tegmen. (×2.6)

Fig. 3.—*Pseudomops gloriosa* new species. Cabima, Panama. Female. *Type.* Dorsal view of wing. (×2.6)

Fig. 4.—*Nyctibora noctivaga* Rehn. Jamaica. Male. Dorsal view of supra-anal plate. (Much enlarged.)

Fig. 5.—*Paratropes pinoganae* new species. Pinogana, Darien, Panama. Female. *Type.* Dorsal view. (×2.9)

Fig. 6.—*Audreia gatunae* new species. Gatun, Canal Zone, Panama. Female. *Type.* Dorsal view. (×2)

Fig. 7.—*Epilampra maya* Rehn. Porto Bello, Panama. Female. Dorsal view of tegmen. (×2)

Fig. 8.—*Hyporhicnoda reflexa* (Saussure and Zehntner). Ujurras de Terraba, head of Rio Ceibo, Costa Rica. Male. Dorsal view. (×2)

Fig. 9.—*Hyporhicnoda reflexa* (Saussure and Zehntner). Gatun, Canal Zone, Panama. Female. Dorsal view (×2)

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Fig. 10.—*Lamproblatta albipalpus* Hebard. Cincinnati, Magdalena, Colombia. Male. *Type*. Dorsal outline. (×2)

Fig. 11.—*Lamproblatta albipalpus* Hebard. Cincinnati, Magdalena, Colombia. Male. *Type*. Lateral outline of caudal tarsal joints. (×7.75)

Fig. 12.—*Lamproblatta albipalpus* Hebard. Cincinnati, Magdalena, Colombia. Female. *Allotype*. Lateral outline of caudal tarsal joints. (×7.75) Compare with figure 11 for sexual differentiation, which is of specific, but not of generic value.

Fig. 13.—*Eurycotis pluto* new species. Porto Bello, Panama. Female. *Type*. Dorsal outline. (Natural size.)

Fig. 14.—*Pycnosceloides aporus* Hebard. Motzorongo, Vera Cruz, Mexico. Female. *Type*. Dorsal view. (×2.5)

Fig. 15.—*Panchlora minor* Saussure and Zehntner. Tabernilla, Canal Zone, Panama. Male. Ventral outline of apex of male abdomen. (Much enlarged.)

Fig. 16.—*Blattella germanica* (Linnaeus). Miami, Florida. Male. Dorsal view of abdomen. (×3)

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Fig. 1.—*Phortioeca phoraspoides* (Walker). Cabima, Panama. Immature female. Dorsal view, showing distinctive color pattern in the immature stages. (×2.2)

Fig. 2.—*Capucinella delicatula* new species. Porto Bello, Panama. Male. *Allotype*. Dorsal view. (×2)

Fig. 3.—*Capucinella delicatula* new species. San Lorenzo, Santa Marta, Colombia. Female. *Type*. Dorsal view. (×2)

Fig. 4.—*Holocompsa panamae* new species. Paraiso, Canal Zone, Panama. Female. *Type*. Dorsal view of pronotum. (×14)

Fig. 5.—*Melestora micra* new species. Paraiso, Canal Zone, Panama. Male. *Type*. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 6.—*Buboblatta armata* (Caudell). Porto Bello, Panama. Female. Dorsal view. (×3)

Fig. 7.—*Buboblatta armata* (Caudell). Porto Bello, Panama. Female. Lateral view of subgenital plate. (Much enlarged.)

Fig. 8.—*Buboblatta armata* (Caudell). Porto Bello, Panama. Female. Ventral view of subgenital plate. (Much enlarged.)

Fig. 9.—*Chorisoneura panamae* new species. Rio Trinidad, Panama. Male. *Paratype*. Cephalic view of occiput, showing characteristic markings. (Much enlarged.)

Fig. 10.—*Chorisoneura panamae* new species. Rio Trinidad, Panama. Male. *Paratype*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 11.—*Chorisoneura fuscipennis* new species. Porto Bello, Panama. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

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Fig. 12.—*Chorisoneura translucida* (Saussure). Tabernilla, Canal Zone, Panama. Male. Dorsal outline of tegmen, showing venation characteristic of this species and allies. (×4.5)

Fig. 13.—*Chorisoneura translucida* (Saussure). Tabernilla, Canal Zone, Panama. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 14.—*Chorisoneura cabimae* new species. Cabima, Panama. Male. *Type.* Cephalic view of occiput, showing characteristic markings. (Much enlarged.)

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Fig. 22.—*Chorisoneura gemmicula* new species. Cabima, Panama. Male. *Type.* Ventral view of subgenital plate. (Much enlarged.)

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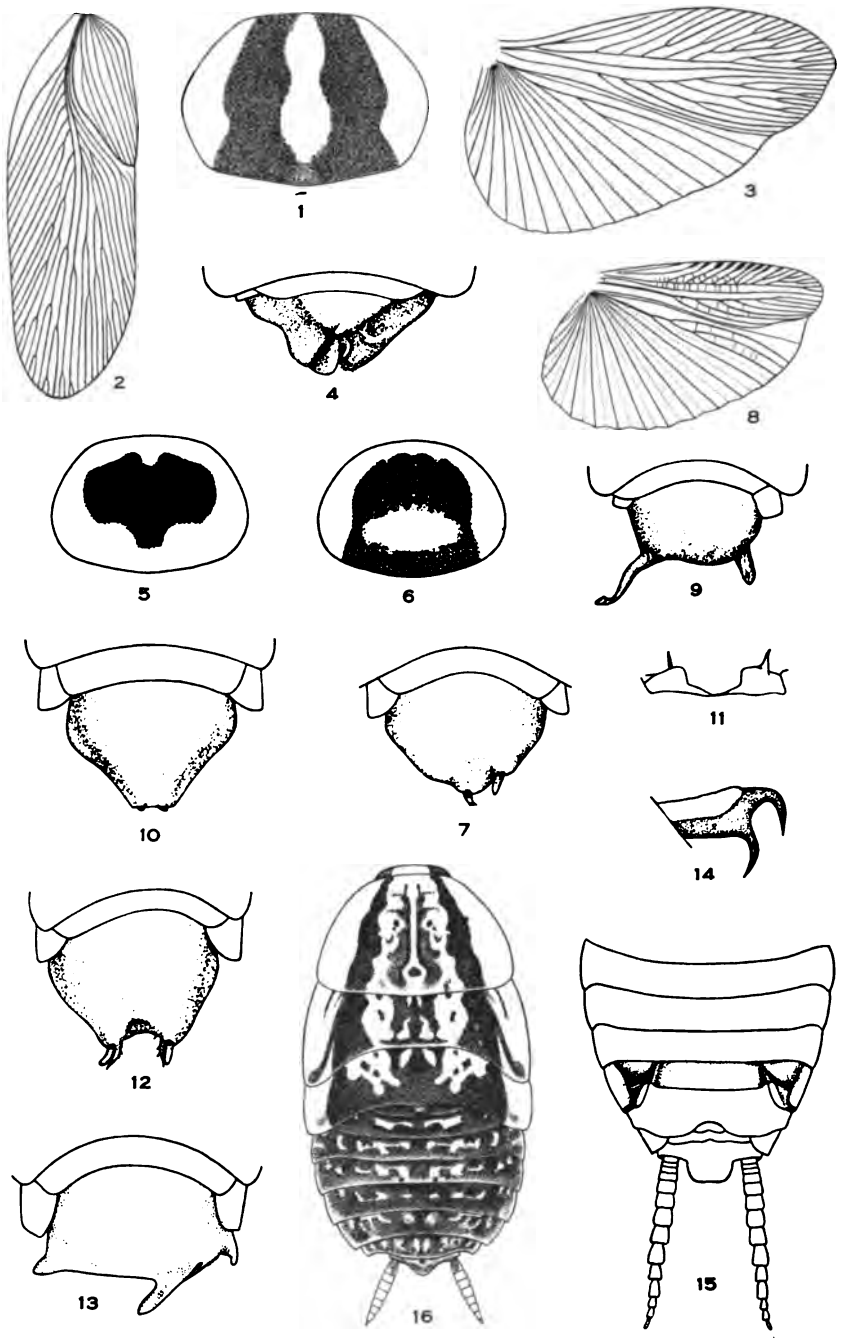

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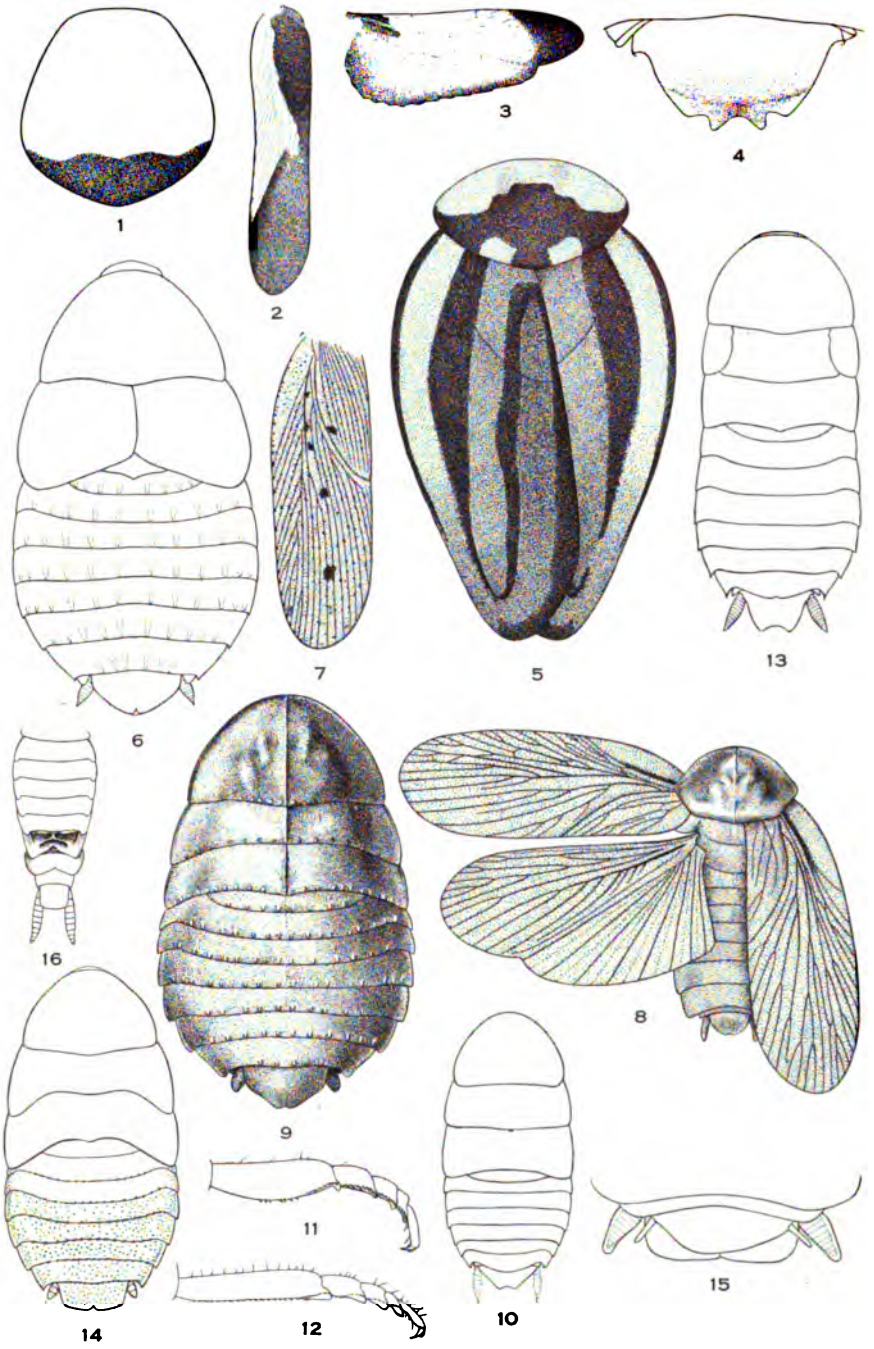

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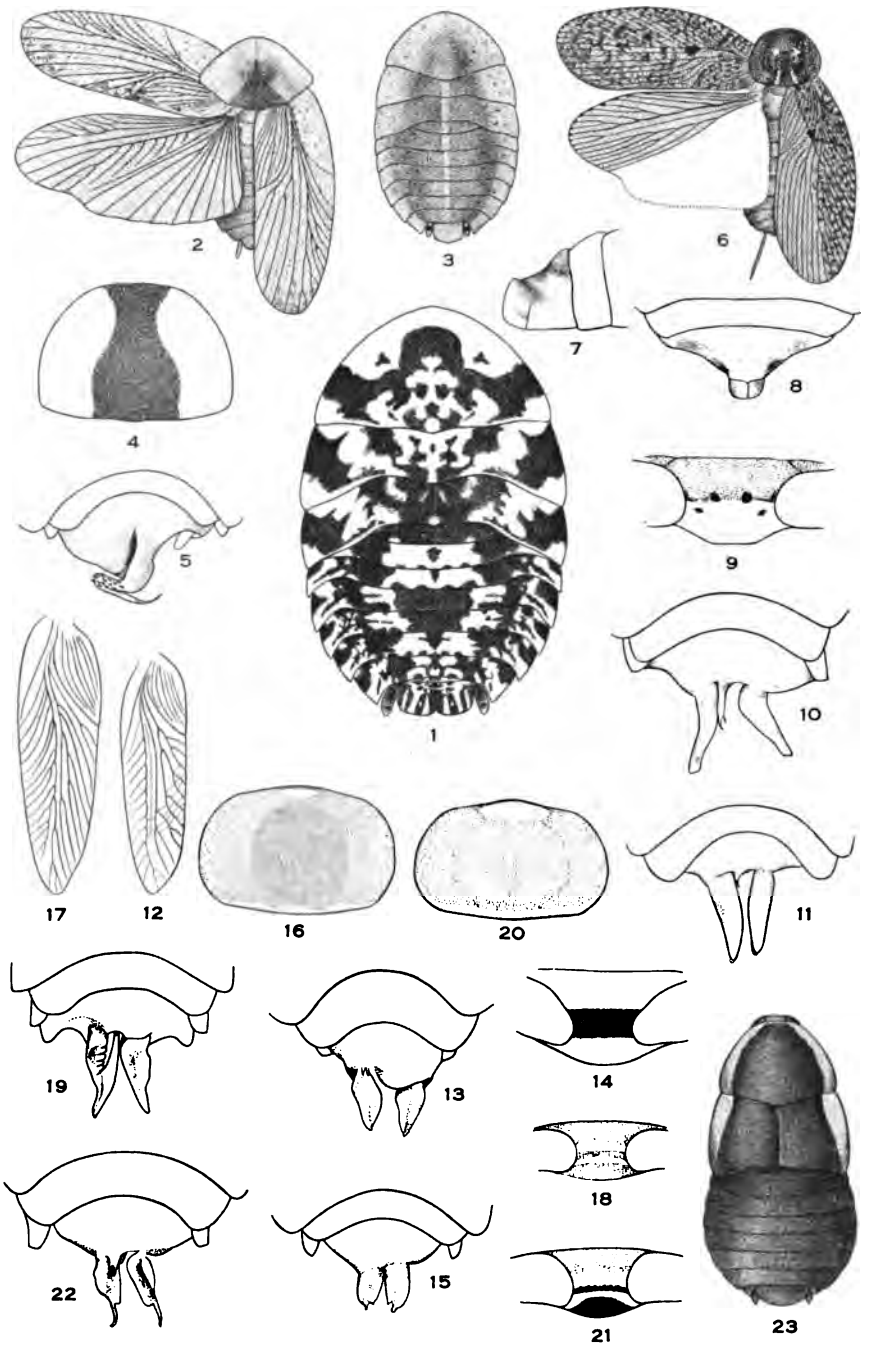

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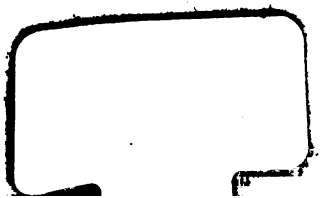

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